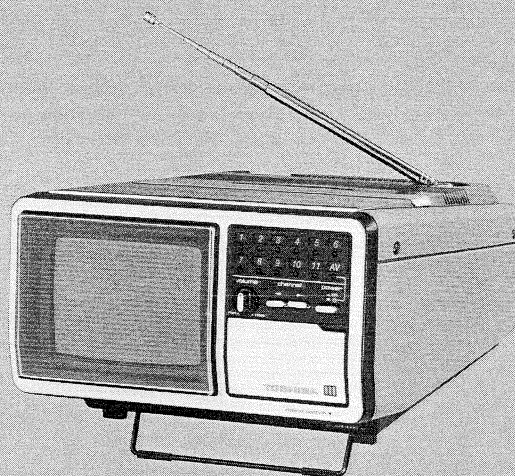


TOSHIBA

COLOUR TELEVISION/BATTERY PACK

C-690/BP600



SPECIFICATIONS

COLOUR TELEVISION C-690

INPUT POWER RATING:	35 watts (nominal), AC 220 volts 50 Hz 25 watts (nominal), DC 12—24 volts
AERIAL INPUT IMPEDANCE:	75 ohm unbalanced type for VHF and UHF
RECEIVING CHANNELS:	Any of VHF channels..... channels 2 to 12 Any of UHF channels..... channels 21 to 68
INTERMEDIATE FREQUENCIES:	Picture I-F carrier frequency..... 38.9 MHz Sound I-F carrier frequency..... 33.4 MHz Colour sub-carrier frequency..... 34.47 MHz
CHASSIS CONSTRUCTION:	IC-Solid State Chassis
PICTURE TUBE:	160AB22 (Y), 12.7 cm (measured on diagonal of viewable picture area) 55° Deflection
SOUND OUTPUT:	0.4 watts (at 10% harmonic distortion, Max. 0.6 watts)
SPEAKER:	Round 8 cm
CABINET:	Plastic, Portable
DIMENSION:	Height..... 16.7 cm Width..... 25.6 cm Depth..... 31.4 cm
WEIGHT (NET):	6.8 kg
AERIAL:	VHF and UHF telescopic (attached), UHF Loop Aerial
AUX. TERMINAL:	Earphone Jack
FEATURES:	AFC, Electronic Tuning, AC/DC Operation
CHASSIS NUMBER:	TAP-911

BATTERY PACK BP600

OUTPUT VOLTAGE:	DC24V
DIMENSION:	Height..... 4.5 cm Width..... 25.2 cm Depth..... 29.4 cm
WEIGHT:	1.3 kg

SAFETY INSTRUCTIONS

X-RAY RADIATION PRECAUTION

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not be above the specified limit. The nominal value of the high voltage of this receiver is 12.7kv at zero beam current (minimum brightness) under a 220v AC power source. The high voltage must not, under any circumstances, exceed 14kv.
Each time a receiver requires servicing, the high voltage should be checked following the HIGH VOLTAGE CHECK procedure on page 18 of this manual. It is recommended the reading of the high voltage be recorded as a part of the service record. It is important to use an accurate and reliable high voltage meter.
2. This receiver is equipped with a fail safe (FS) circuit which prevents the receiver from producing an excessively high voltage even if the B+ voltage increases abnormally. Each time the receiver is serviced, the FS circuit must be checked to determine that the circuit is properly functioning, following the FS CIRCUIT CHECK procedure on page 18 of this manual.
3. The only source of X-RAY RADIATION in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.
4. Some parts in this receiver have special safety-related characteristics for X-RAY RADIATION protection. For continued safety, parts replacement should be undertaken only after referring to the PRODUCT SAFETY NOTICE below.

SAFETY PRECAUTION

1. Potentials as high as 11,000 volts are present when this receiver is operating. Operation of the receiver outside the cabinet or with the back cover removed involves a shock hazard from the receiver.
 1. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high-voltage equipment.
 2. Always discharge the picture tube anode to the receiver chassis to keep off the shock hazard before removing the anode cap.
 3. Perfectly discharge the high potential of the picture tube before handling the tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled.
2. If any Fuse in this TV receiver is blown, replace it with the FUSE specified in the chassis parts list.
3. When replacing parts or circuit boards, wind the lead wires around terminals before soldering.
4. When replacing a high wattage resistor (oxide metal film resistor) in circuit board, keep the resistor 10 mm away from circuit board.
5. Keep wires away from high voltage or high temperature components.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-RAY RADIATION protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements; electrical components having such features are identified by shading on the schematic diagram and the parts list.
Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create X-RAY RADIATION.

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SERVICE NOTE

Model C-690 is designed to operate on either AC 220 volts 50 Hz or DC 12 to 24 volts (car battery with negative grounded system) or battery pack for exclusive use (optional).

When using the set in the car which has positive grounded system, following modification is required.

1. Open the car battery cord plug by removing 1 screw.
2. Change the wiring connections of the contacts reversely.
(See figure 1.)

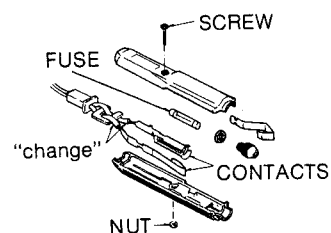


Figure 1. Polarity Change

1. FRONT AND REAR CONTROL VIEWS

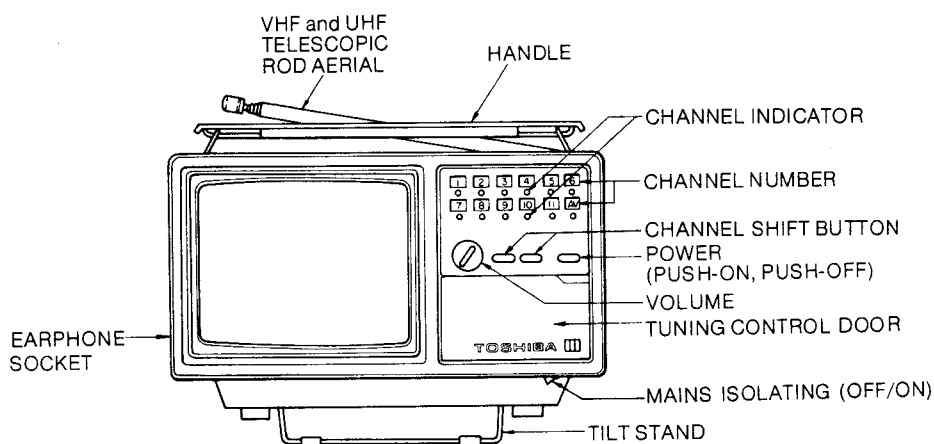


Figure 2. Front Controls

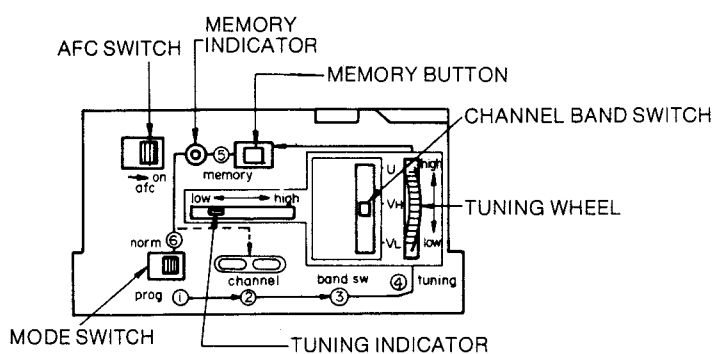


Figure 3. Tuning Controls (In Door)

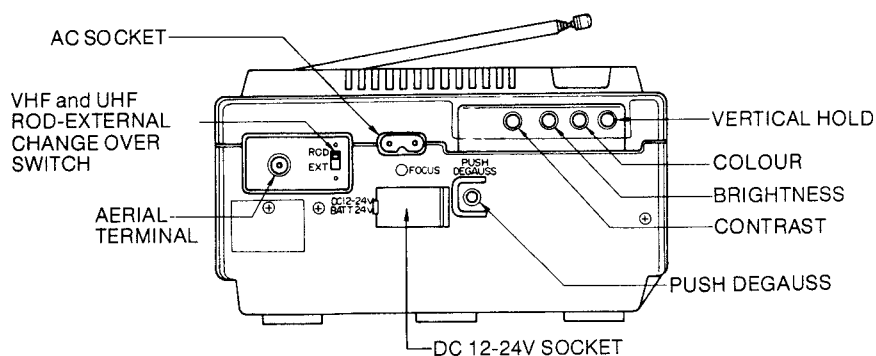
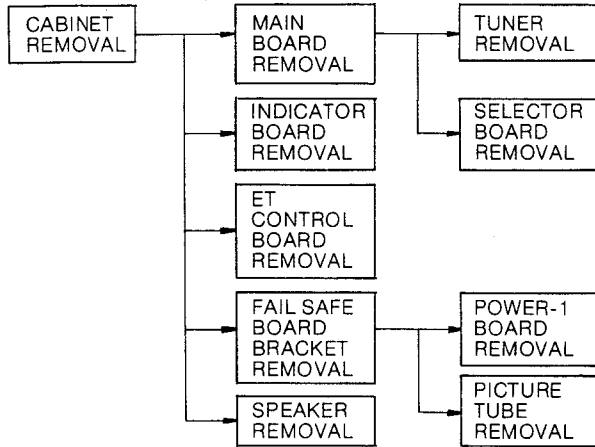


Figure 4. Rear Controls

2. MECHANICAL DISASSEMBLIES

2-1. PROCEDURES

Take the proper procedures referring the following table when disassembling the set.



2-3. MAIN BOARD REMOVAL (See figure 6.)

1. Remove 4 screws securing the main board to the chassis.
2. Detach the main board.

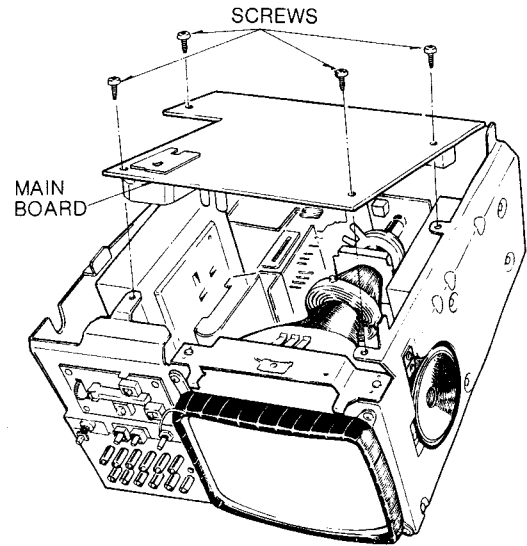


Figure 6. Main Board Removal

2-2. CABINET REMOVAL (See figure 5.)

1. Remove 8 screws (A) and 1 screw (B).
2. Remove volume knob.
3. Detach top cover, front panel and bottom cover in that order.

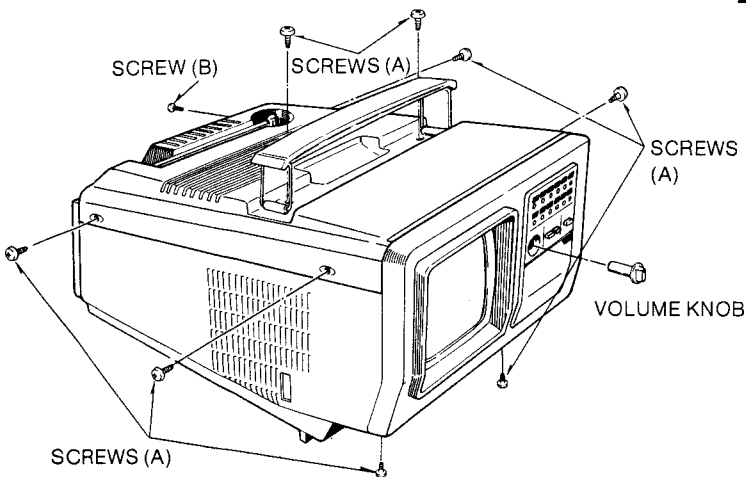


Figure 5. Cabinet Removal

2-4. SELECTOR BOARD BRACKET REMOVAL (See figure 7.)

1. Remove 2 screws (A).
2. Draw out the selector board bracket.

2-5. TUNER REMOVAL (See figure 7.)

1. Remove 2 screws (A).
2. Remove 3 screws (B).
3. Draw out the tuner.

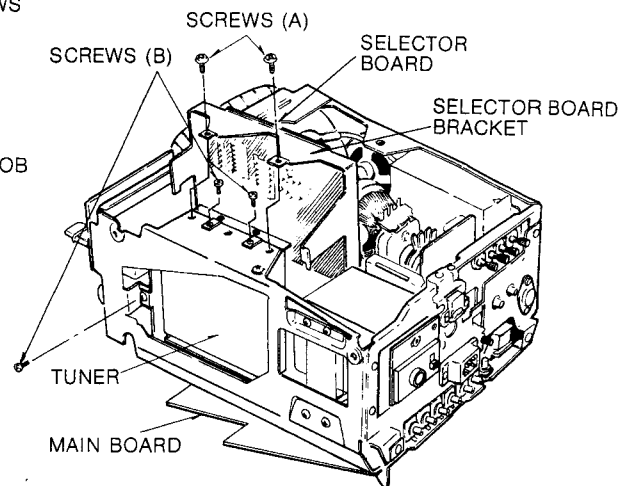


Figure 7. Selector Board Bracket and Tuner Removal

2-6. INDICATOR BOARD REMOVAL (See figure 8.)

1. Remove 2 screws (A).
2. Unplug 15-pin socket (P521) on the selector board.
3. Detach the indicator board.

2-7. ET CONTROL BOARD REMOVAL (See figure 8.)

1. Remove 3 screws (B).
2. Detach the ET control board.

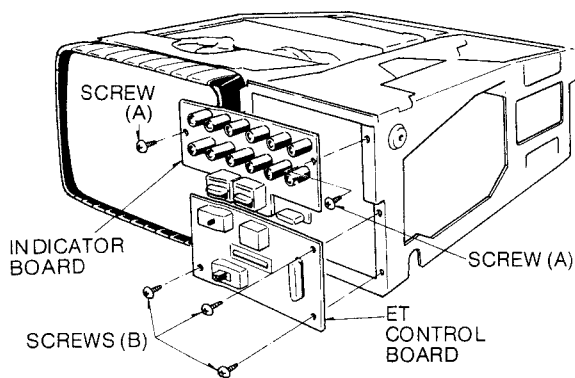


Figure 8. Indicator and ET Control Board Removal

2-8. FAIL SAFE BOARD BRACKET REMOVAL (See figure 9.)

1. Remove 2 screws (A).
2. Detach the fail safe board.

2-9. POWER-1 BOARD REMOVAL (See figure 9.)

1. Unplug the degauss lead socket on the power-1 board.
2. Take out the power-1 board by removing 2 hooks holding the power-1 board to the chassis.

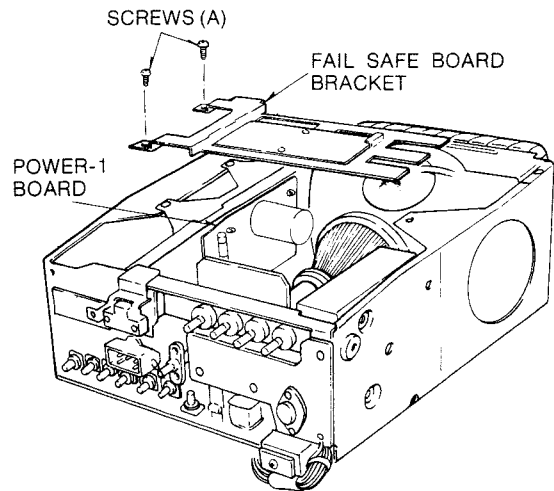


Figure 9. Fail Safe and Power-1 Board Removal

2-10. PICTURE TUBE REMOVAL (See figure 10.)

1. Detach the degaussing coil.
2. Detach the picture tube anode cap and the picture tube socket (CRT drive board).
3. Loosen the clamp screws securing the purity convergence magnets assembly and the deflection yoke to the neck of picture tube.
4. Remove 4 screws (A) securing the picture tube to the chassis.
5. Then carefully take out the picture tube by detaching the purity convergence magnets assembly and the deflection yoke.

2-11. SPEAKER REMOVAL (See figure 10.)

1. Detach the rubber cushion.
2. Remove 1 screw (B) with the speaker retainer.
3. Detach the speaker from the chassis.

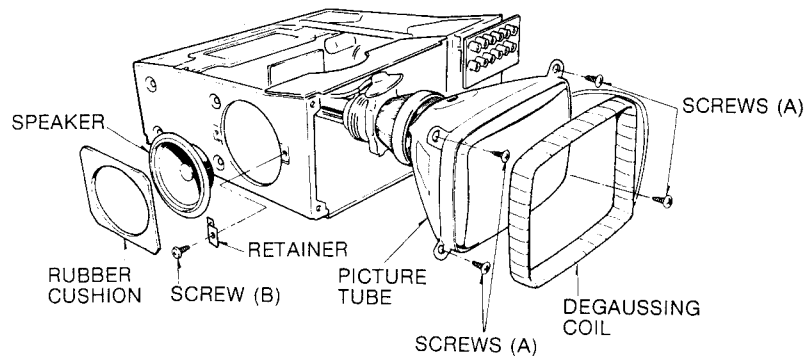


Figure 10. Picture Tube and Speaker Removal

3. CHASSIS REAR VIEW

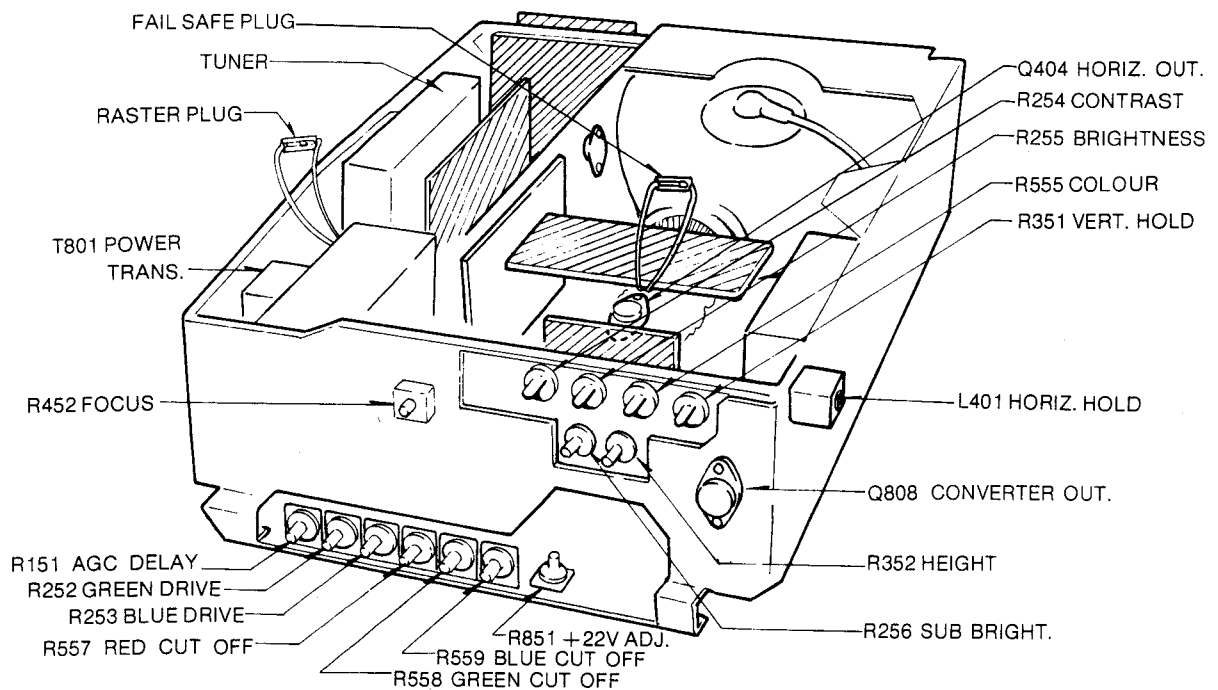


Figure 11. Chassis Rear View

4. MAIN BOARD TOP VIEW

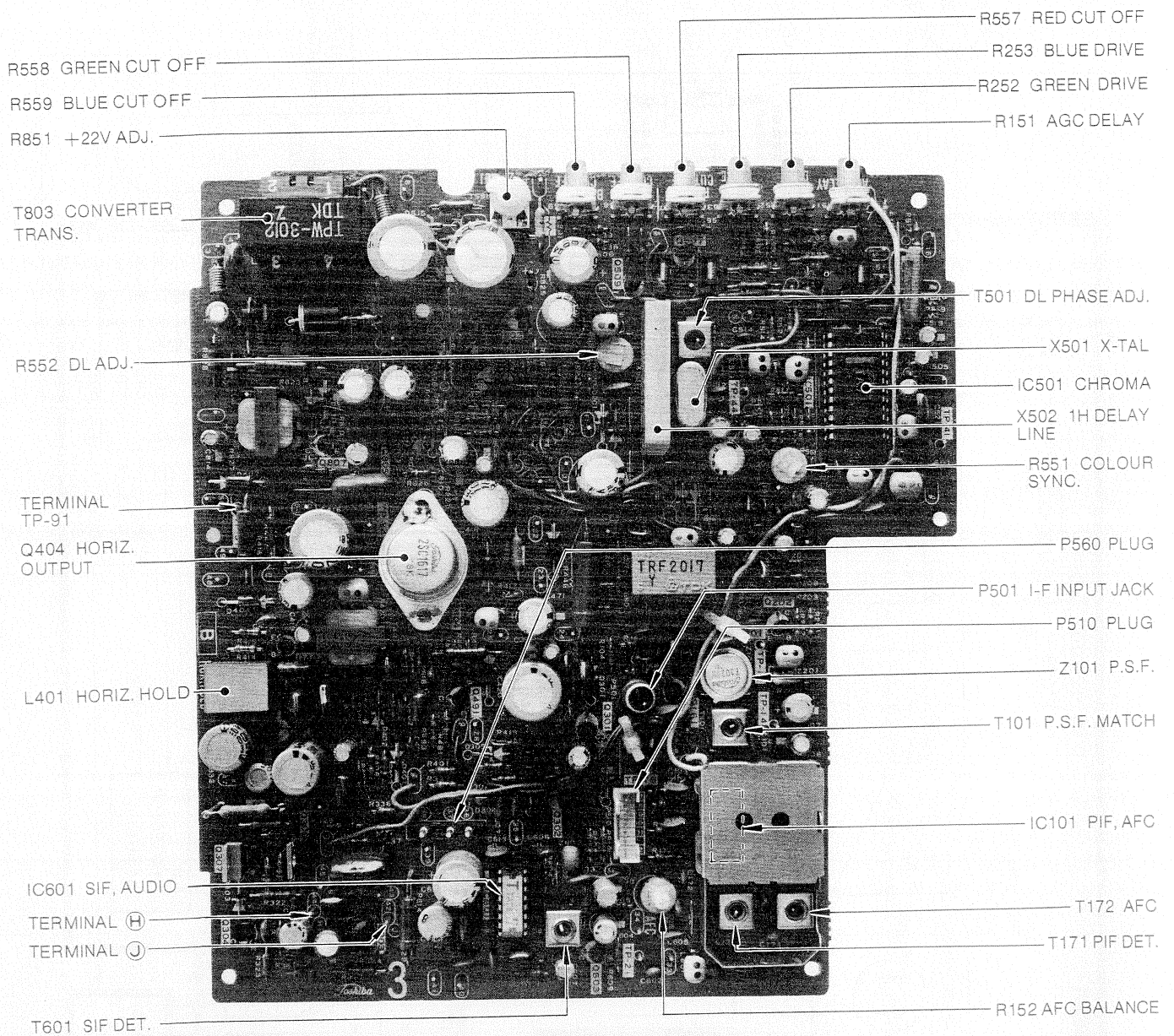
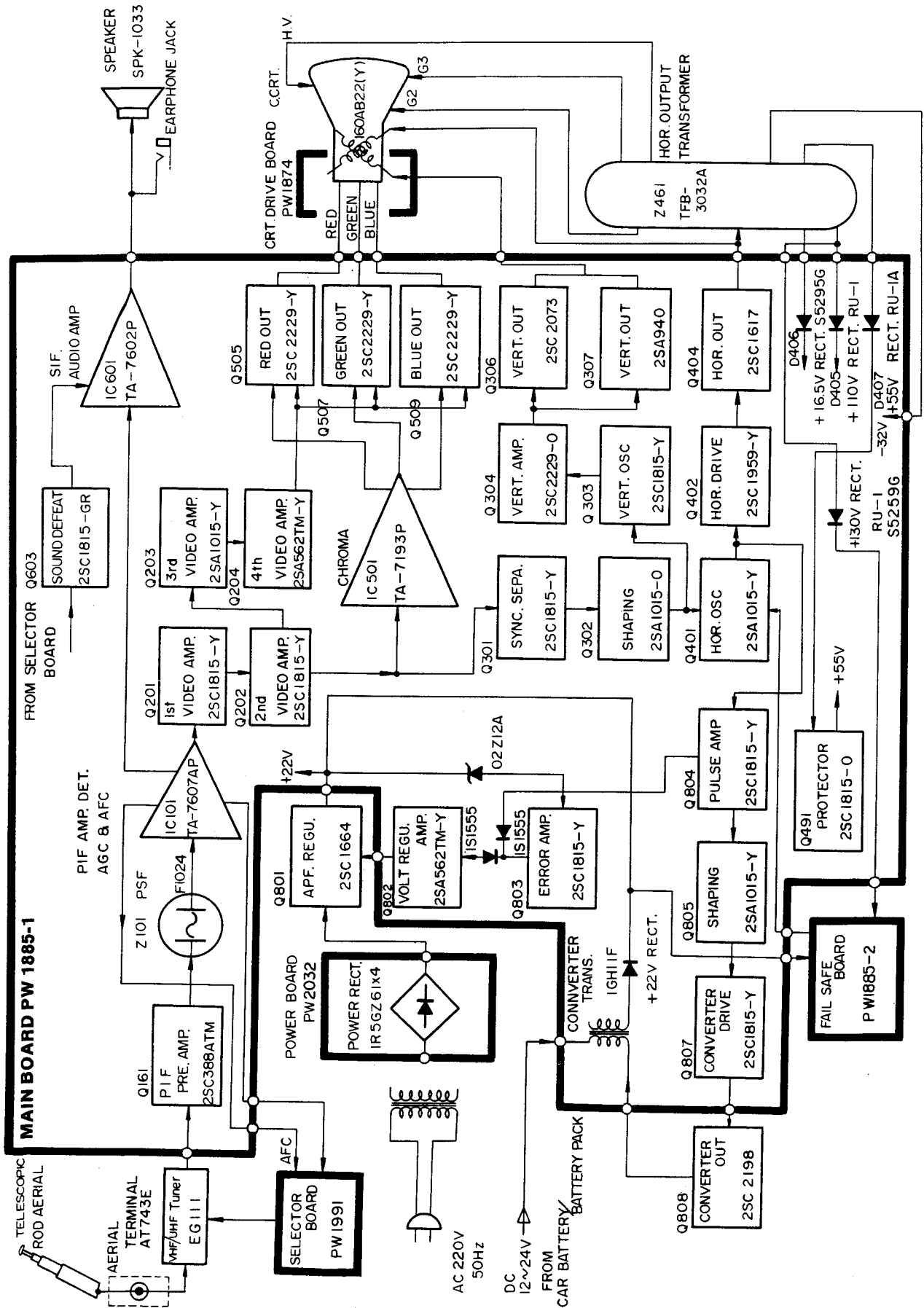


Figure 12. Main Board Top View

5. BLOCK DIAGRAM



6. TROUBLESHOOTING CHART

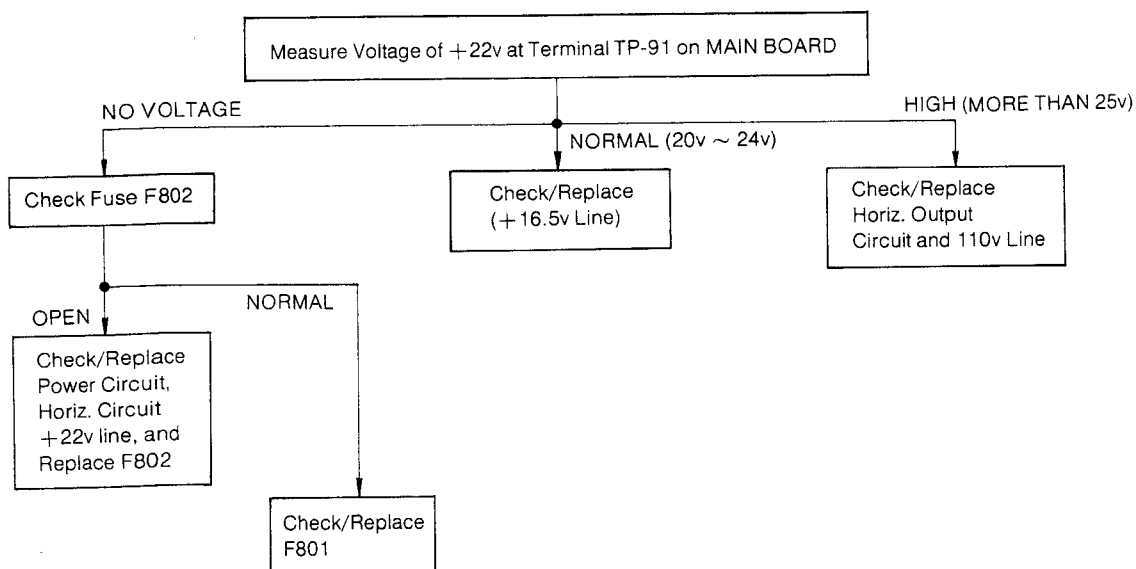
The following charts are devoted to troubleshooting which, if followed carefully, will assist you in tracking down a fault to the correct stage.

In order to utilize the charts (fault trees), firstly establish the complaint, i.e. — No Raster, No Sound.

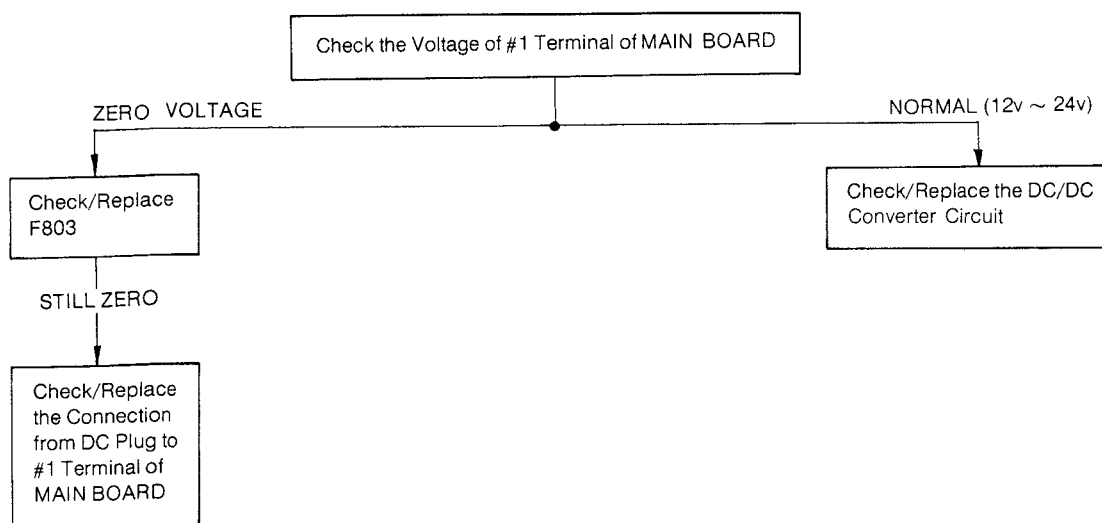
Locate the chart applicable and then progress through the various alternatives until a final block indicates the offending components or stage.

6-1. NO RASTER AND NO SOUND

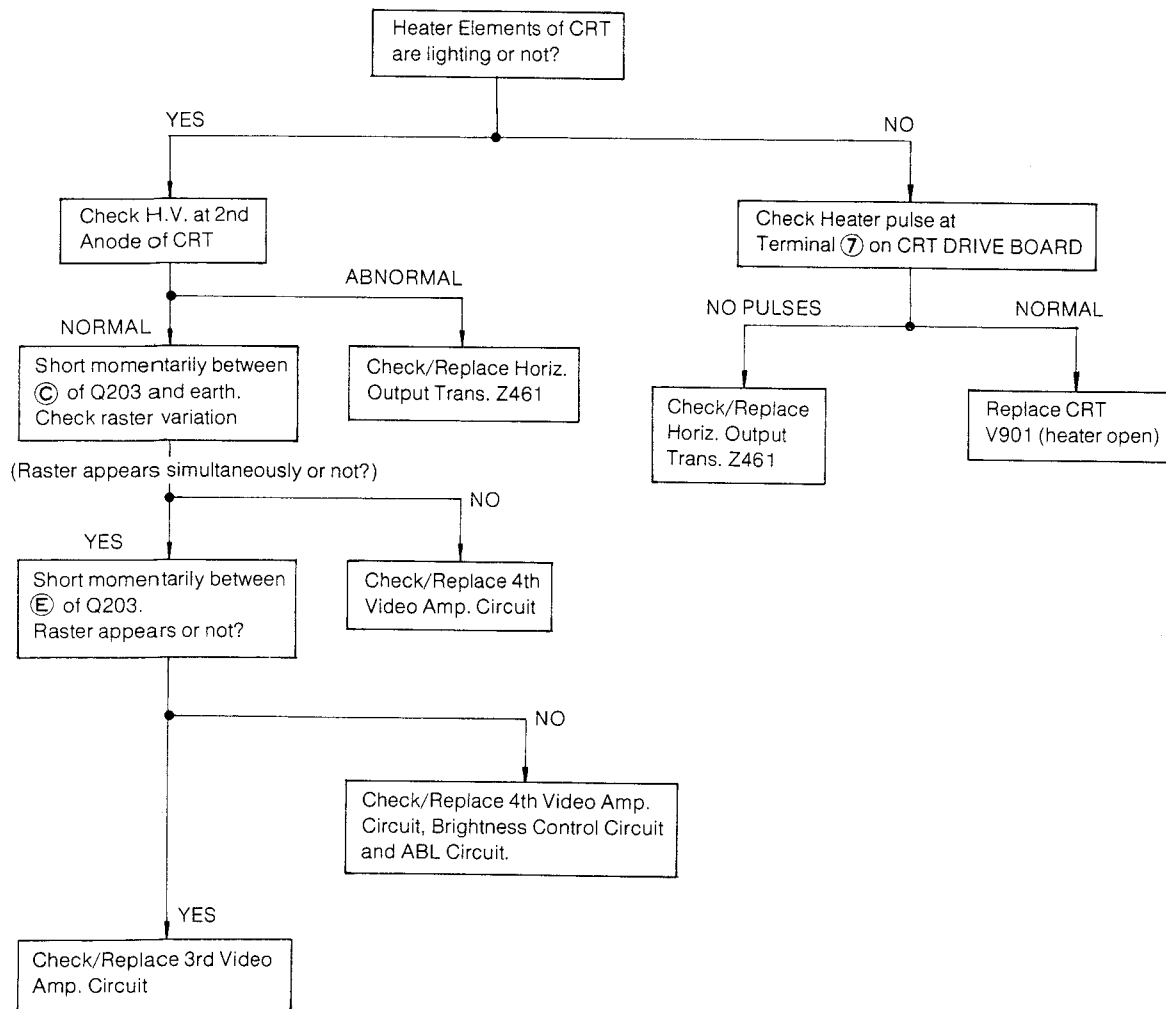
(i) AC Operation



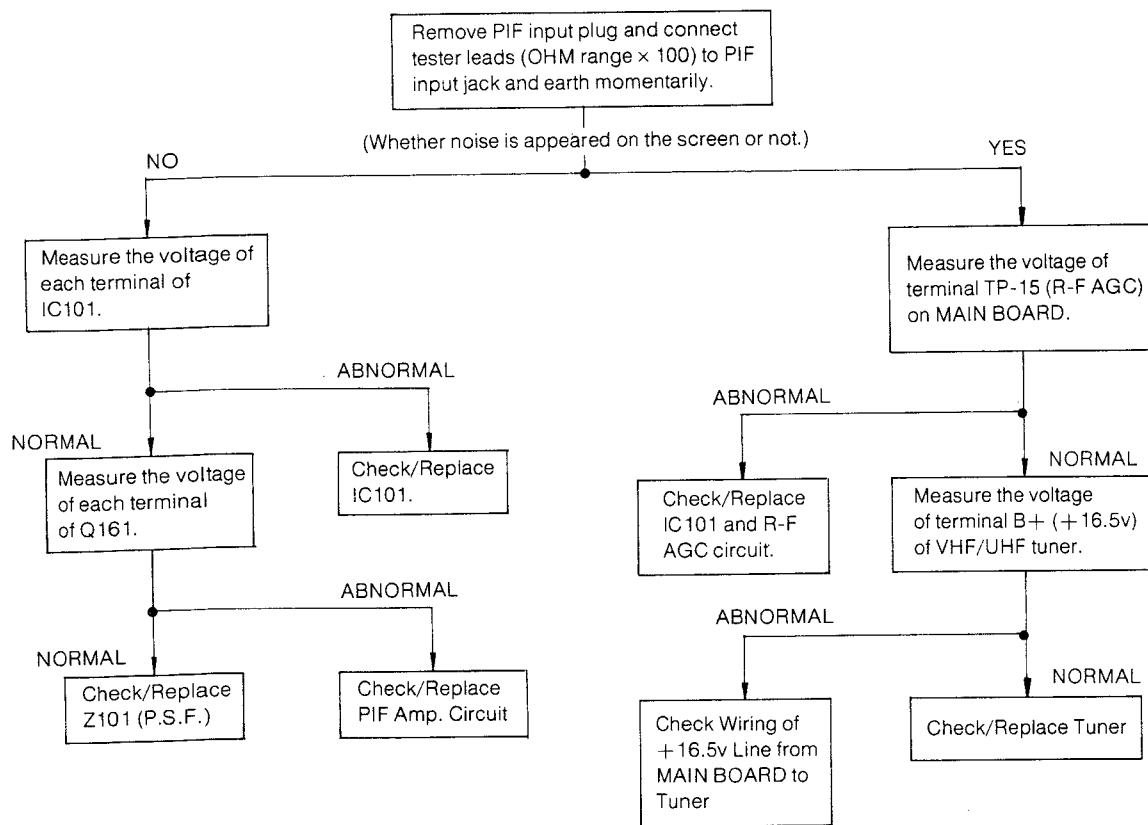
(ii) DC Operation (AC Operation OK)



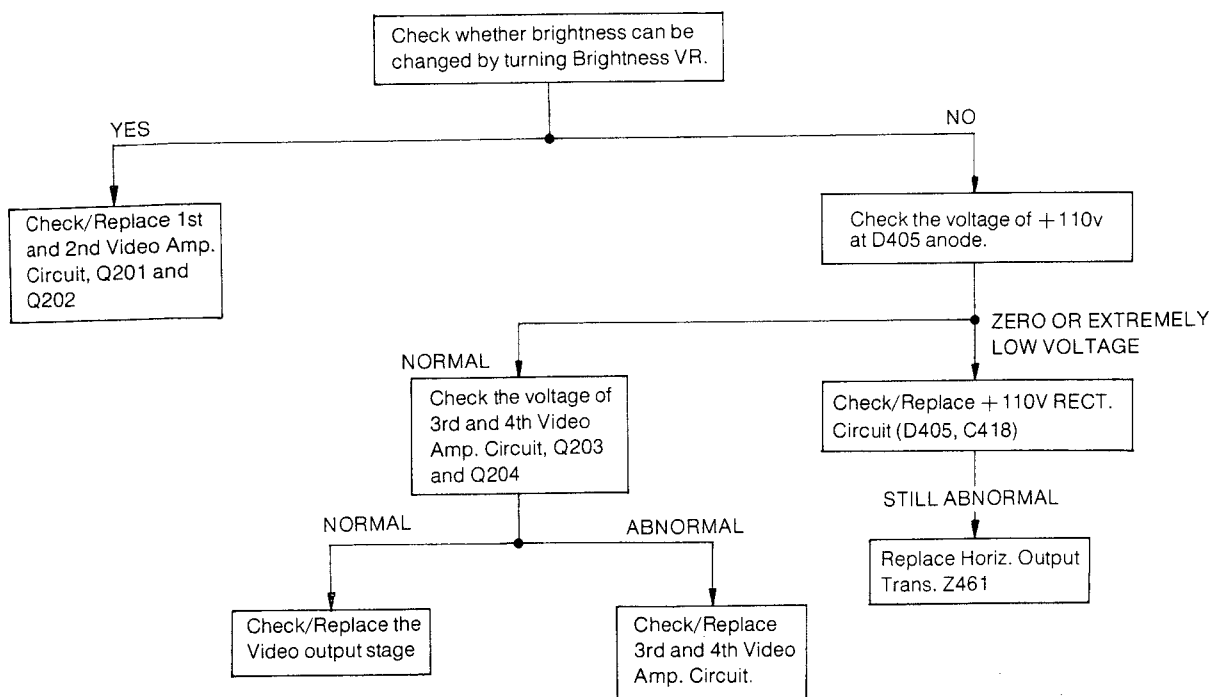
6-2. NO RASTER (SOUND OK)



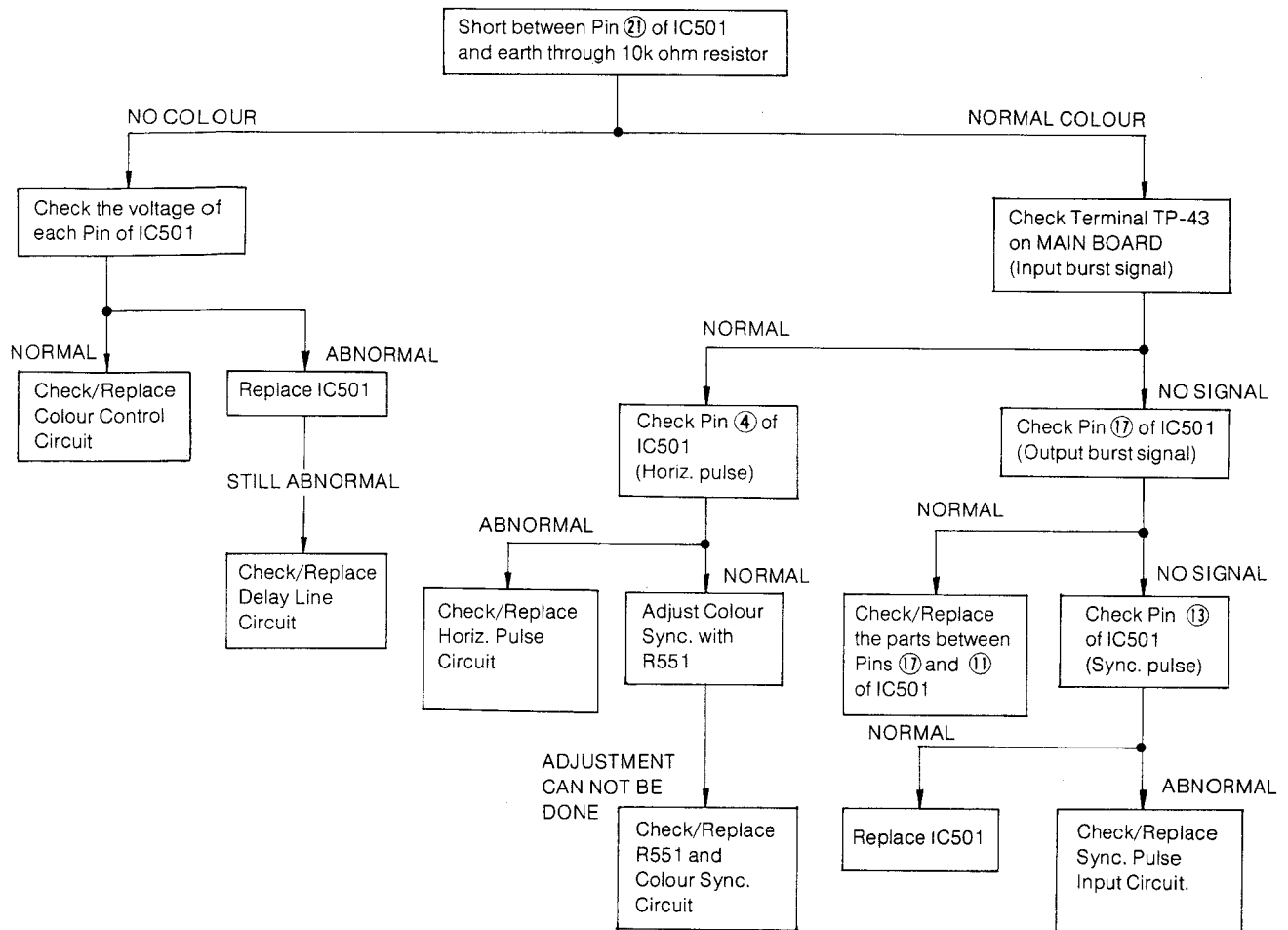
6-3. NO PICTURE (RASTER REMAIN) AND NO SOUND



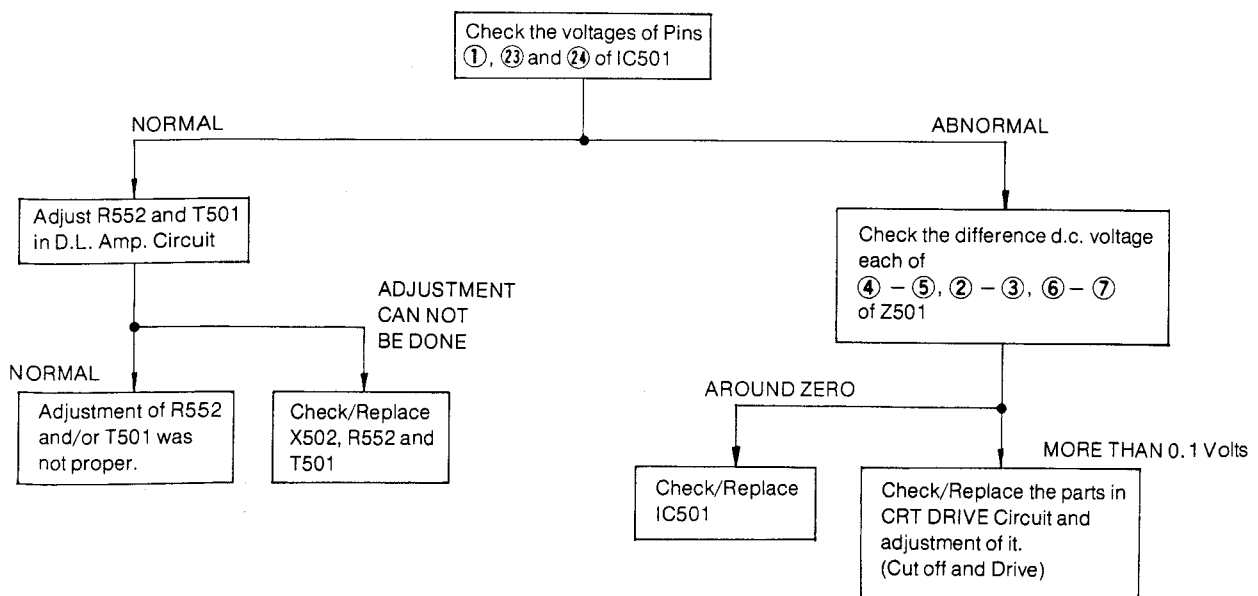
6-4. NO PICTURE (RASTER AND SOUND OK)



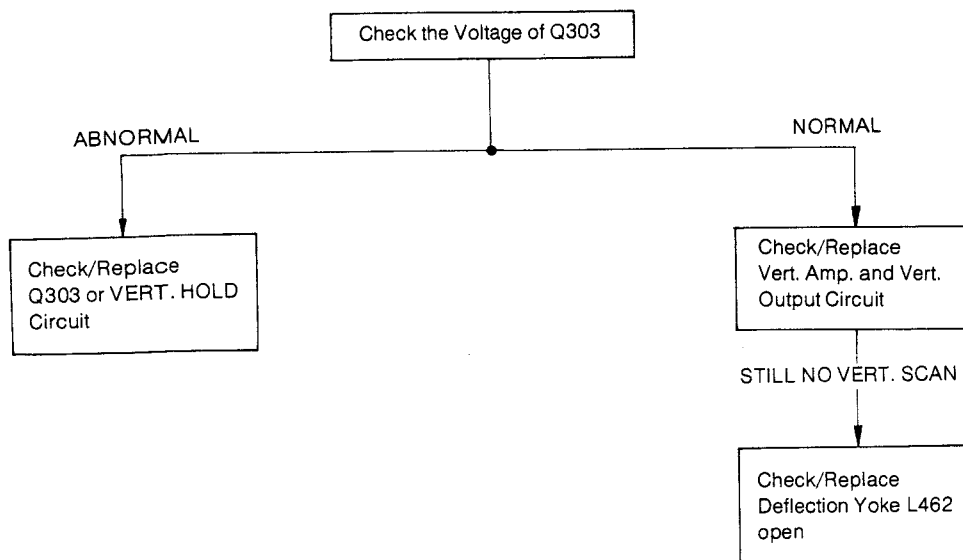
6-5. NO COLOUR



6-6. SPECIFIC TINTED COLOUR



6-7. NO VERT. SCAN (ONE HORIZ, LINE RASTER)



6-8. OUT OF VERT. SYNC. AND HORIZ. SYNC.

Check/Replace Sync. Sep. Circuit from (E) of Q202 to (B) of Q301.

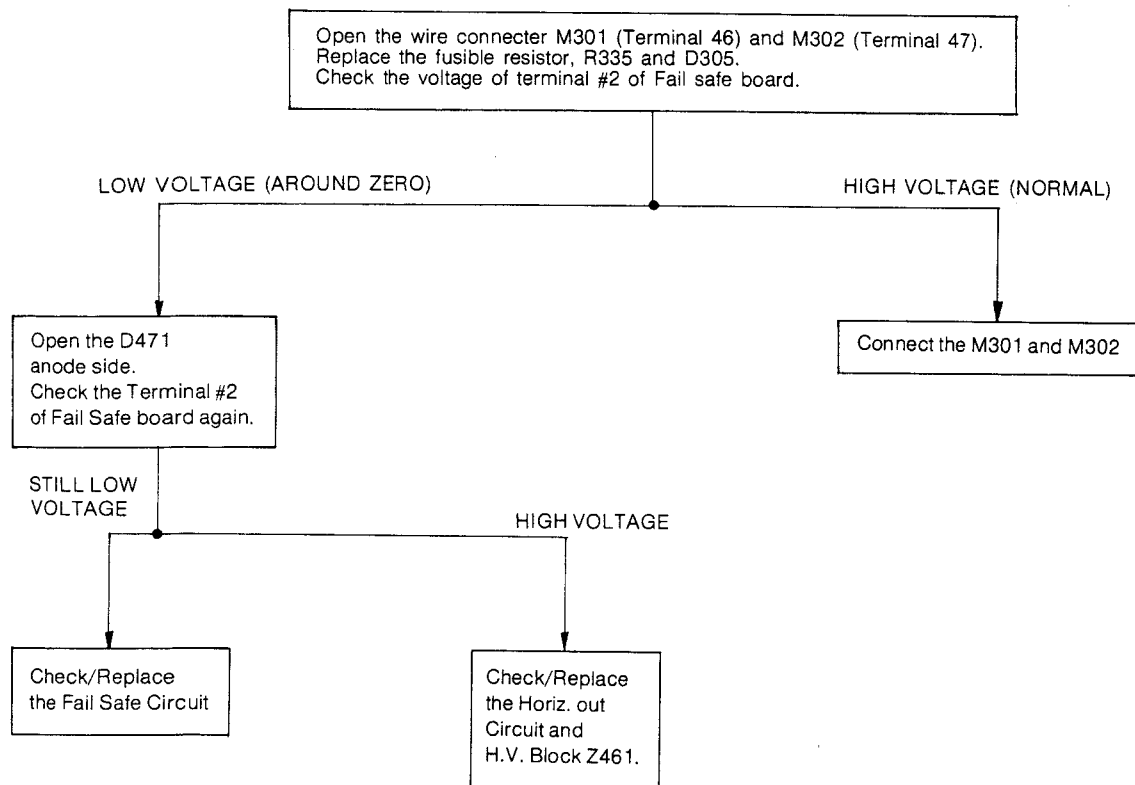
6-9. OUT OF VERT. SYNC.

Check/Replace Vert. OSC. Circuit and Vert. Hold Circuit, Q301.

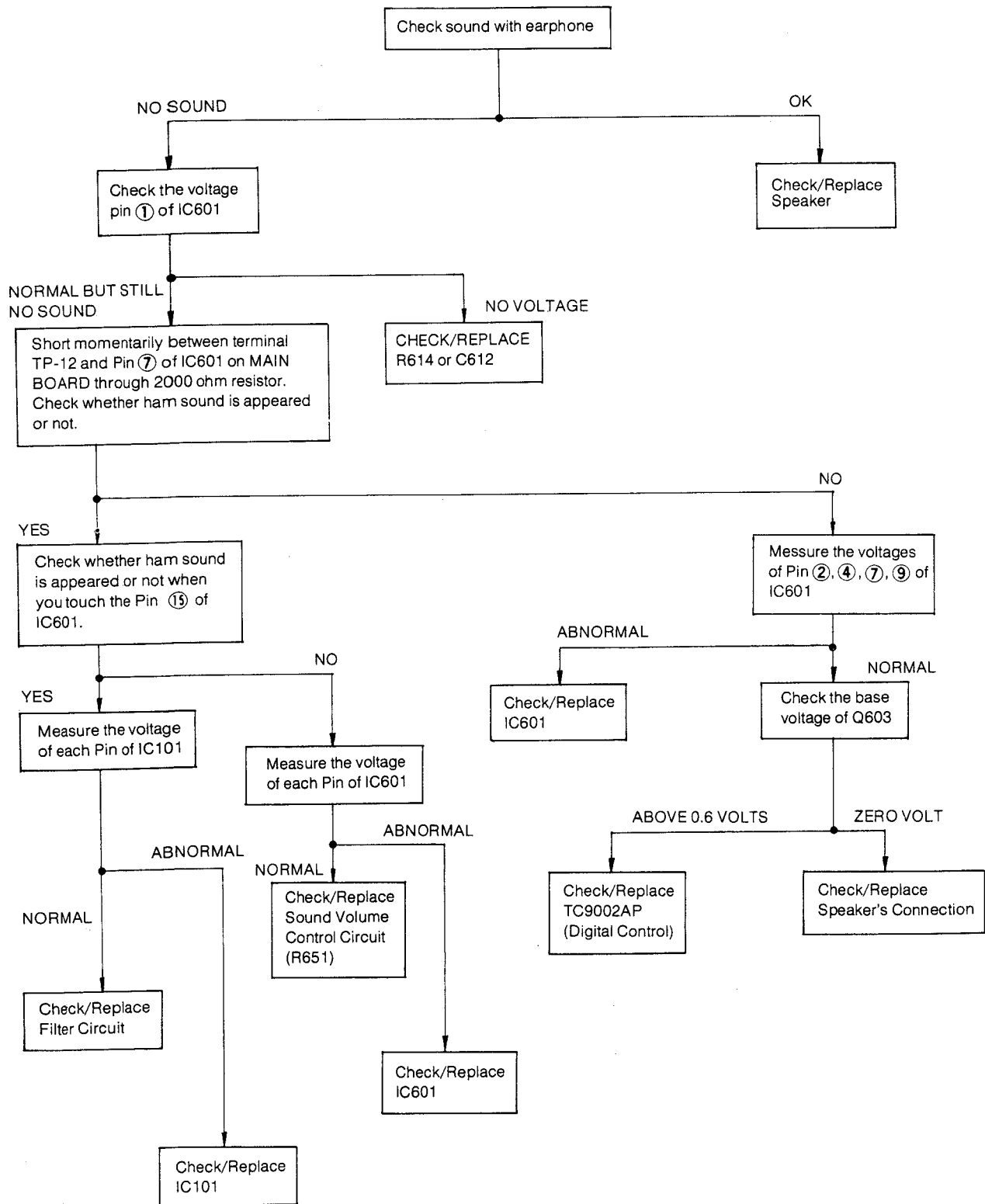
6-10. OUT OF HORIZ. SYNC.

Check/Replace Horiz. OSC Circuit (Q401), Horiz. Hold Circuit (L401) and AFC Circuit.

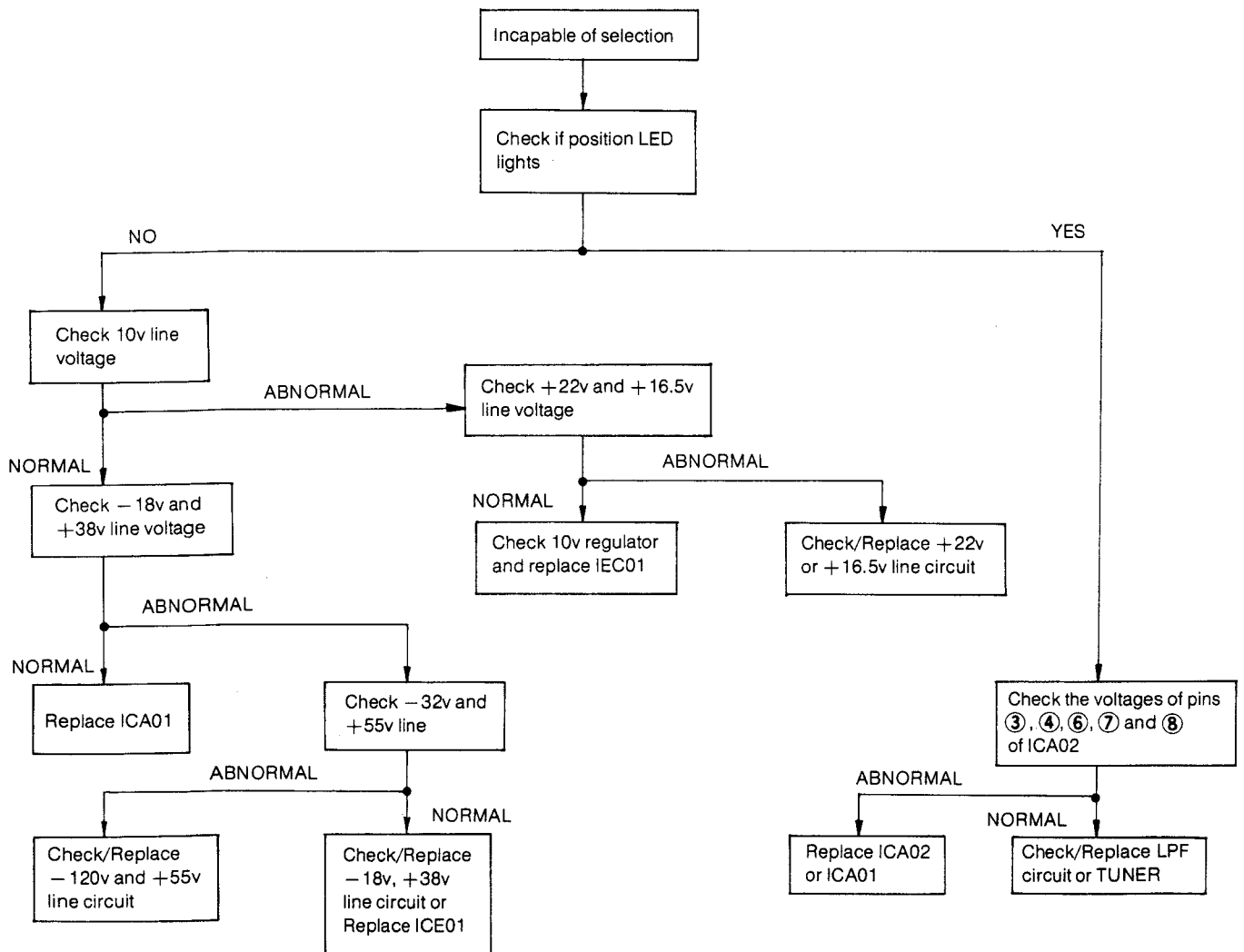
6-11. SHADED PICTURE
(Especially, middle parts of screen is dark.)



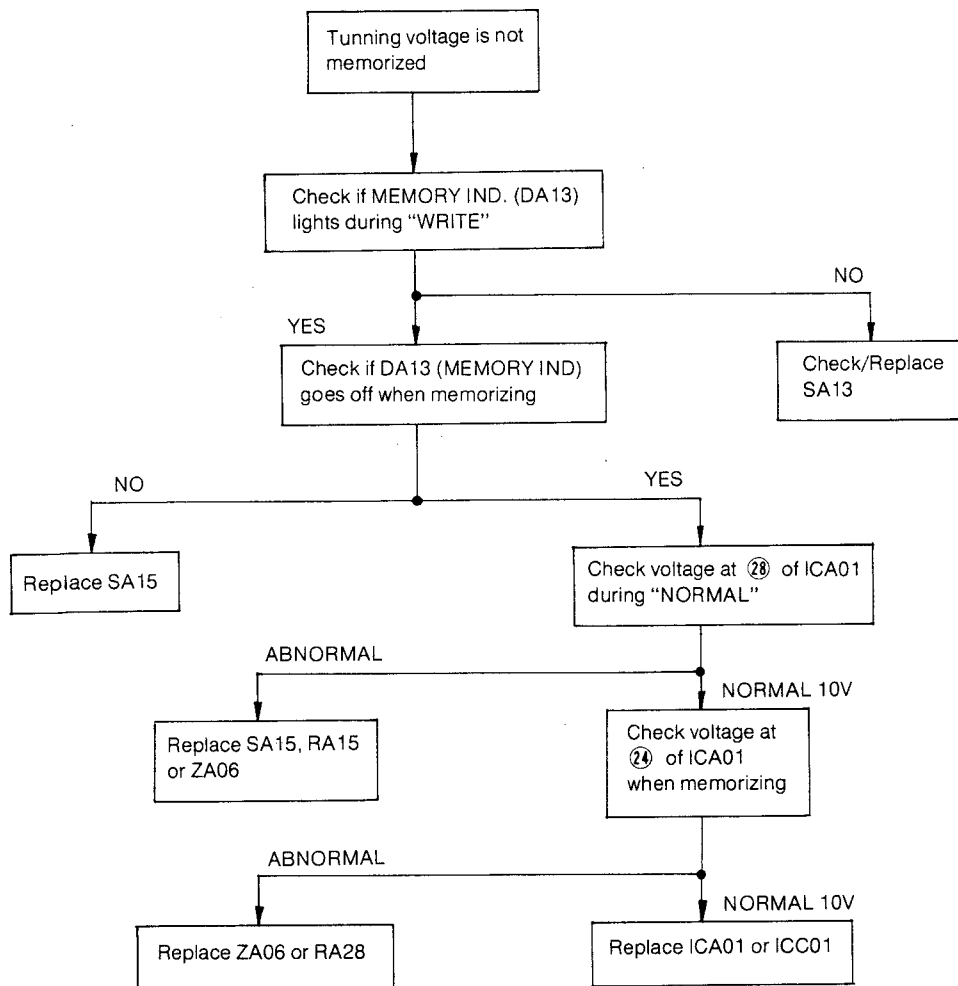
6-12. NO SOUND (PICTURE OK)



6-13. INCAPABLE OF SELECTION



6-14. INCAPABLE OF MEMORIZATION



7. INSTALLATION AND SERVICE ADJUSTMENTS

7-1. GENERAL

In the majority of cases, a colour television receiver will need only slight touch-up adjustment upon installation.

Check the basic characteristics such as height, vertical sync., horizontal sync. and focus.

Observe the picture for good black and white details without objectionable colour shading. If colour shading is evident, demagnetize the receiver.

If colour shading still persists, perform purity and convergence adjustments. This should be all that is necessary to achieve optimum receiver performance.

7-2. VERTICAL OSCILLATOR ADJUSTMENT

If the picture moves up or down on the screen, adjust the VERTICAL HOLD control (R351) at the rear of the receiver.

7-3. HORIZONTAL OSCILLATOR ADJUSTMENT

If there is an indication of unstable horizontal sync., adjust the HORIZONTAL HOLD (L401) shown in figure 12 to correct the condition. Adjust the control to the centre of the pull-in range.

7-4. +22 VOLT POWER SUPPLY ADJUSTMENT

CAUTION: B+ voltage closely relates to the high voltage. To prevent hazardous X-RAY RADIATION, the B+ voltage must be properly adjusted to +22 volts.

1. Tune in an active channel. Adjust the BRIGHTNESS AND CONTRAST controls for normal picture.
2. Check that AC power line voltage is normal (AC 220 volts 50 Hz).
3. Connect a VTVM between terminal TP-91 on the main board (See figure 12) and chassis ground.
4. Adjust the +22 ADJ. (R851) on the main board (See figure 11) for +22 volts reading. Remove a VTVM.

7-5. HEIGHT ADJUSTMENT

The HEIGHT control (R352) shown in figure 11 changes the size of the picture or pattern. Make final adjustment to overscan the mask about 10% vertically.

7-6. FOCUS ADJUSTMENT

Adjust the FOCUS control (R452) shown in figure 11 for well defined scanning lines on the picture screen.

7-7. HIGH VOLTAGE CHECK

CAUTION: There is no HIGH VOLTAGE ADJUSTMENT on this chassis. The +22 volt power supply must be properly adjusted to insure the correct high voltage.

1. Connect an accurate high voltage meter to the second anode of the picture tube.
2. Turn on the receiver. Set the BRIGHTNESS and CONTRAST controls to minimum (zero beam current).
3. High voltage will be measured below 14kv.
4. Rotate the BRIGHTNESS control to both extremes to be sure the high voltage does not exceed the limit under any conditions.

7-8. FS CIRCUIT CHECK

The fail safe (FS) circuit check is indispensable for the final check in the servicing. Checking should be done following the steps below.

1. Disconnect the fail safe plug (Figure 11).
2. Turn the power switch on and adjust customer controls for normal operation.
3. Temporarily short terminal (R) and terminal (X) on the fail safe board with a jumper wire. Raster and sound will disappear.

4. The receiver must remain in this state even after removing the jumper wire. This is the evidence that the FS circuit is functioning properly.
5. To obtain a picture again, temporarily turn the receiver off and allow the FS circuit more than 30 seconds to reset. Then turn the power switch on to produce a normal picture.
6. Connect the fail safe plug.

7-9. AGC DELAY ADJUSTMENT

1. Tune in the strongest station in your area.
2. Turn on the AFC switch (SA16). (See figure 3.)
3. Turn the AGC DELAY control (R151) shown in figure 11 fully counterclockwise, then turn it clockwise until snow noise just disappears from the screen.

7-10. AFC (Automatic Frequency Control) FIELD ALIGNMENT

1. Place AFC Switch in OFF position. Tune the set to an active channel and adjust fine tuning for best picture.
2. Place AFC Switch in ON position, and adjust Trans. (T172) on Main Board for best picture. Picture quality should be the same as that obtained in Step 1.
3. Check the AFC PULL-IN action by turning the tuning Control clockwise and counterclockwise.

7-11. COLOUR SYNC. ADJUSTMENT

1. Tune in a colour programme and warm up for five minutes.
2. Connect terminal TP-43 and the Main Board earth with the short jumper wire.
3. Connect the 21st pin of IC501 and the Main Board earth with 10k ohm resistor so that the colour killer turns off.
4. Then the colour stripes appear on the screen when the adjustment is incorrect. Adjust the colour sync. VR (R551) so that the colour bar pattern stands still or drifts slowly across the picture screen.
5. Remove the 10k ohm resistor.

7-12. PAL MATRIX ADJUSTMENT

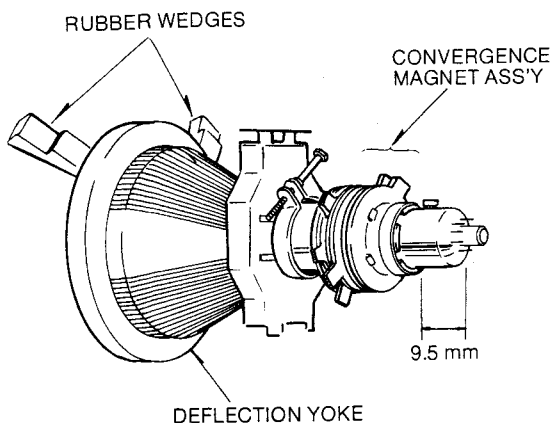
1. Tune in the colour programme including the colour bar signals. For example, the Philips pattern is available.
2. Set the colour Control VR to obtain the proper colour.
3. If the PAL MATRIX adjustment is incorrect, the Venetian Blind would appear in the colour bars area. This case needs the adjustment.
4. At the first, adjust DL PHASE ADJ. Coil T501 to minimize the Venetian Blind.
5. Next, connect the terminal TP-43 and the Main Board earth with capacitor (30 pfd — 50 pfd). If the Venetian Blind appears, adjust DL ADJ. VR (R552) to minimize the Blind.
6. Remove the capacitor, and if the Venetian Blind still remains, adjust DL PHASE ADJ. Coil T501 to minimize the Blind again.
7. Repeat the item 5 and 6 procedures, adjust the R552 and T501 until the Blind don't appear when the capacitor is connected.

7-13. SIF DET. COIL ADJUSTMENT (This adjustment needs the oscilloscope)

1. Tune in a programme which has a pure tone. (For example 400 Hz or 1 kHz.)
2. Connect the probe of oscilloscope to pin #9 of IC601 on Main Board.
3. Adjust SIF DET. COIL T601 (See figure 20) so that the detected signal amplitude (pure tone) goes to maximum.

7-14. CRT GRAY SCALE ADJUSTMENT

1. Tune in an active channel.
2. Set the COLOUR control to minimum.
3. Turn the SCREEN control (R951) fully counterclockwise.
4. By rotating the RED, GREEN and BLUE CUT OFF controls (R557, R558, R559) counterclockwise from the maximum, set them to the position where notches of the knobs become parallel to the surface of the Board.
5. Set the GREEN and BLUE DRIVE controls (R252, R253) to the mid position.
6. Disconnect the raster plug. (See figure 11.)
7. Short temporarily terminals ① and ② on the main board (See figure 12) with a jumper wire. (The picture will become a single horizontal line.)
8. Rotate the SCREEN control (R951) gradually clockwise until the second horizontal colour line following the first line appears slightly on the screen. Then turn fully counterclockwise the two CUT OFF controls corresponding to the colours of the first and the second horizontal lines to eliminate the lines.
9. Set the SCREEN controls to the position where the third horizontal line lights slightly on the screen.
10. Adjust the two CUT OFF controls set to the minimum in item 8 above to obtain the slightly lighted horizontal line in the same levels of three (red, green, blue) colours. (The line should be white if the CUT OFF controls are adjusted properly.)
11. Remove a jumper wire between terminals ① and ② and reconnect the raster plug.
12. Rotate the BRIGHTNESS and CONTRAST controls to the maximum.
13. Adjust the BLUE and GREEN DRIVE controls to obtain proper white-balanced picture in high light areas.
14. Rotate the BRIGHTNESS and CONTRAST controls to obtain dark gray raster. Then check the white balance in low brightness. If the white balance is not proper, retouch the CUT OFF controls and DRIVE controls to obtain a good white balance in both low and high light areas.



7-15. SUB-BRIGHTNESS ADJUSTMENT

1. Tune in a colour programme.
2. Set the CONTRAST control to maximum and the BRIGHTNESS control to the click position.
3. Set the COLOUR control to the centre.
4. Set the SUB-BRIGHT control (R256) to center and leave the receiver for five minutes in this state.
5. Watching the picture carefully, adjust the SUB-BRIGHT control in the position where the picture does not show evidence of blooming in high brightness area and not appear too dark in low bright area.
6. Check for proper picture variation by rotating the CONTRAST and BRIGHTNESS controls to both extremes.
7. If the picture does not appear dark with the CONTRAST and BRIGHTNESS controls turned to minimum, or not appear bright with the controls turned to maximum, adjust the SUB-BRIGHT control again for an acceptable picture.

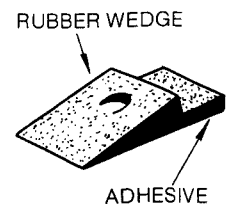
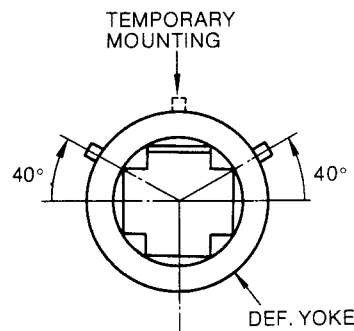
7-16. CONVERGENCE MAGNET ASSEMBLY POSITIONING

Convergence magnet assembly and rubber wedges need mechanical positioning following the figure 13.

7-17. COLOUR-PURITY-ADJUSTMENT

Note: Before attempting any purity adjustments, the receiver should be operated for at least fifteen minutes.

1. Demagnetize the picture tube and cabinet using a degaussing coil.
2. Turn the CONTRAST and BRIGHTNESS controls to maximum.
3. Adjust RED and BLUE CUT OFF controls (R557 and R559) to provide only a green raster. Advance the GREEN CUT OFF control (R558) if necessary.
4. Loosen the clamp screw holding the yoke, and slide the yoke backward to provide vertical green belt (zone) in the picture screen.
5. Remove the Rubber Wedges.
6. Rotate and spread the tabs of the purity magnet (See figure 14) around the neck of the picture tube until the green belt is in the centre of the screen. At the same time, centre the raster vertically.
7. Move the yoke slowly forward until a uniform green screen is obtained. Tighten the clamp screw of the yoke temporarily.
8. Check the purity of the red and blue raster by adjusting the CUT OFF controls.
9. Obtain a white raster, referring to "CRT GRAY SCALE ADJUSTMENT".
10. Proceed with convergence adjustment.



RUBBER WEDGES LOCATION

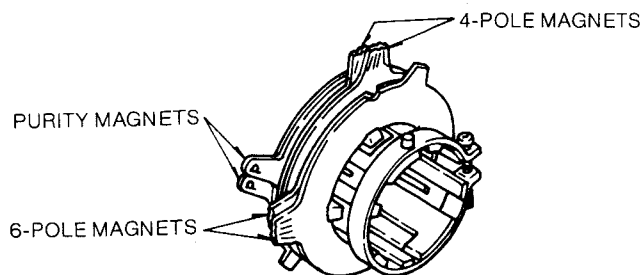
Figure 13.

7-18. CONVERGENCE ADJUSTMENTS

Note: Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

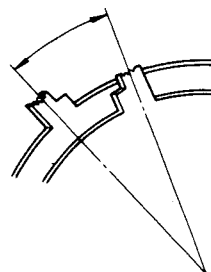
■ Centre Convergence Adjustment

1. Receive crosshatch pattern with a colour bar signal generator.
2. Adjust the BRIGHTNESS and CONTRAST Controls for well defined pattern.
3. Adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 14) and superimpose red and blue vertical lines in the centre area of the picture screen. (See figure 15.)
4. Turn the both tabs at the same time keeping the constant angle to superimpose red and blue horizontal lines at the centre of the screen. (See figure 15.)
5. Adjust two tabs of 6-Pole Magnets to superimpose red/blue line with green one. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
6. Repeat adjustments 3, 4, 5, keeping in mind red, green and blue movement, because 4-Pole Magnets and 6-Pole Magnets interact and make dot movement complex.

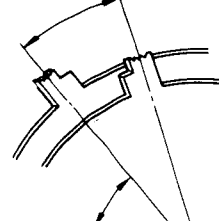


CONVERGENCE MAGNET ASSEMBLY

ADJUST THE ANGLE
(VERTICAL LINES)



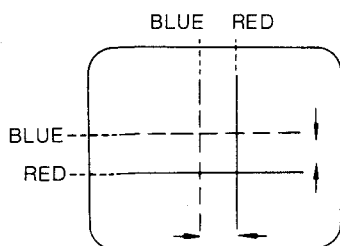
FIXED



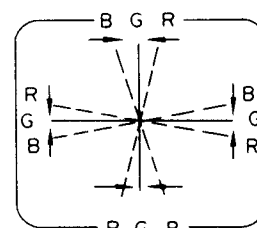
ROTATE TWO TABS
AT THE SAME TIME
(HORIZONTAL LINES)

ADJUSTMENT OF MAGNETS

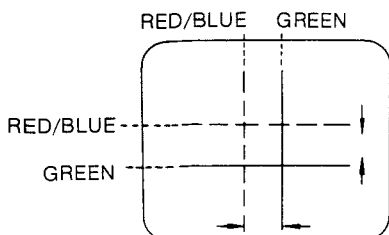
Figure 14.



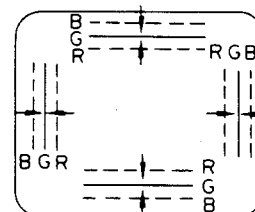
4-POLE MAGNETS MOVEMENT



INCLINE THE YOKE UP (OR DOWN)



6-POLE MAGNETS MOVEMENT



INCLINE THE YOKE RIGHT (OR LEFT)

Centre Convergence by Convergence Magnets

Circumference Convergence by DEF. Yoke

Figure 15. Dot Movement Pattern

8. GENERAL ALIGNMENT INSTRUCTIONS

8-1. GENERAL

Alignment is an exacting procedure and should be undertaken only when necessary.

The test equipment specified or its equivalent is required to properly perform the alignment procedures which are outlined on the following pages. Use of equipment which does not meet these requirements may result in the inability to properly align the receiver.

It is essential that bias values as specified are maintained during alignment to insure proper results.

8-2. EQUIPMENT TERMINATIONS

Alignment pads are designed for correct matching of the equipment to the circuits involved. Failure to use proper matching will result in responses which cannot be depended upon as representing the true operation of the receiver. The pads should be constructed as compactly as possible with all unshielded leads not in excess of 2.5 cm long.

8-3. SIGNAL OVERLOAD

Use of excessive signal from the sweep generator can cause overloading of receiver circuits. To determine that this condition is not present and that the response curve is true, turn the sweep generator output to zero and then gradually increase the output until a response is obtained. Further increase of the sweep output should not change the configuration of the response except in amplitude. If the response changes in configuration, just as flattening at the top or dropping below the base line at the bottom, decrease the sweep output to restore the proper configuration. The oscilloscope gain should be as high as possible to maintain a useable pattern with the peak-to-peak values specified, thus requiring a lower output from the sweep generator and less chance of overload.

Insertion of markers from the marker generator should not cause distortion of the response.

8-4. TEST EQUIPMENTS

OSCILLOSCOPE (WIDE BAND)

COLOUR-BAR/DOT/CROSSHATCH GENERATOR

TV SWEEP MARKER ALIGNMENT GENERATOR

VACUUM TUBE VOLTMETER

VOLT-OHM MILLIAMMETER

MARKER GENERATOR

POWER AND AGC BIAS SUPPLY

DIRECT LOW CAPACITY PROBE

SOUND SIGNAL GENERATOR

VIDEO SWEEP GENERATOR

MATCHING PAD (See figure 16)

DEGAUSSING COIL—Demagnetized picture tube and chassis.

MICROSCOPE—Microscope of approximately 12 power for phosphor dot observation in the colour picture tube.

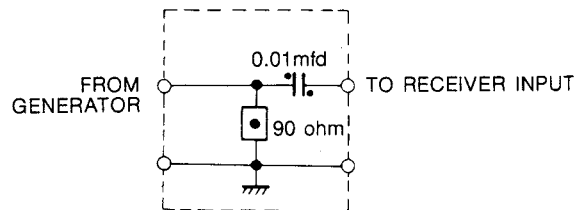


Figure 16. Matching Pad

9. PICTURE I-F SWEEP ALIGNMENT

GENERAL..... Refer to figures 17 and 20 for test equipment connection and alignment points.
 PRELIMINARY STEPS..... 1. Disconnect the I-F cable from the input jack "P501" and the leads from the plug "P510" on Main Board. (See figure 20.)
 2. Supply +12 volts to a lead wire of R446 (C446 side) on Main Board.
 3. Supply +8 volt bias to terminal "TP-14" on Main Board.
 4. Turn AGC DELAY Control (R151) on Main Board fully clockwise.
 SWEEP/MARKER GENERATOR..... Connect to the input jack "P501" on Main Board.
 Tune to 25–45 MHz sweep.
 OSCILLOSCOPE..... Connect with direct probe to terminal "TP-12" on Main Board through 100k ohm resistor.

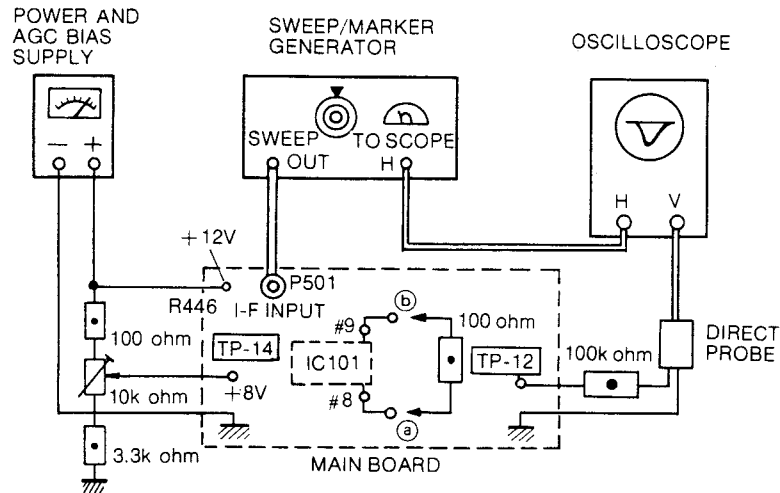


Figure 17. Picture I-F Sweep Alignment

STEP	SWEEP/MARKER GENERATOR	ADJUST	REMARKS
T171 ALIGNMENT			
Set Oscilloscope gain for 0.1v/cm. Adjust sweep output for easy alignment. (See figure 18.)			
Detector Coil	38.9 MHz Marker "ON"	T171	Adjust T171 for maximum gain at 38.9 MHz on SCOPE. (See figure 18.)
OVERALL RESPONSE ALIGNMENT			
Observe with 0.5 volt P-P on SCOPE. Adjust sweep output for easy alignment. (0.1v/cm) Attach 100 ohm resistor between point (a) and (b) (pins #8 and #9 of IC101) of the foil side of the Main Board. (See figure 20.)			
I-F Overall Response	36.9 MHz Marker "ON"	T101	Adjust T101 for maximum gain at 36.9 MHz on SCOPE. (See figure 19.)
After completing the above steps, disconnect equipment and adjust the AGC DELAY Control (R151) following DELAYED R-F AGC ADJUSTMENT on page 18.			

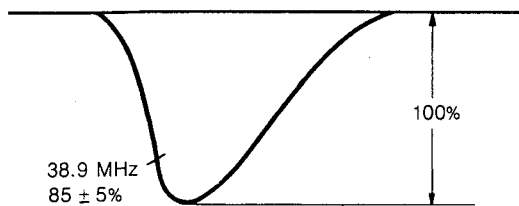


Figure 18. Magnified Response Curve

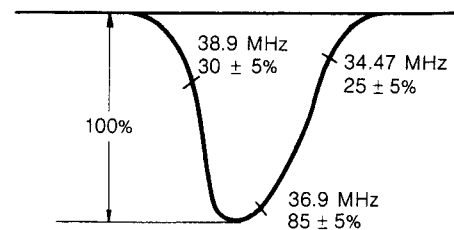


Figure 19. Overall Response Curve

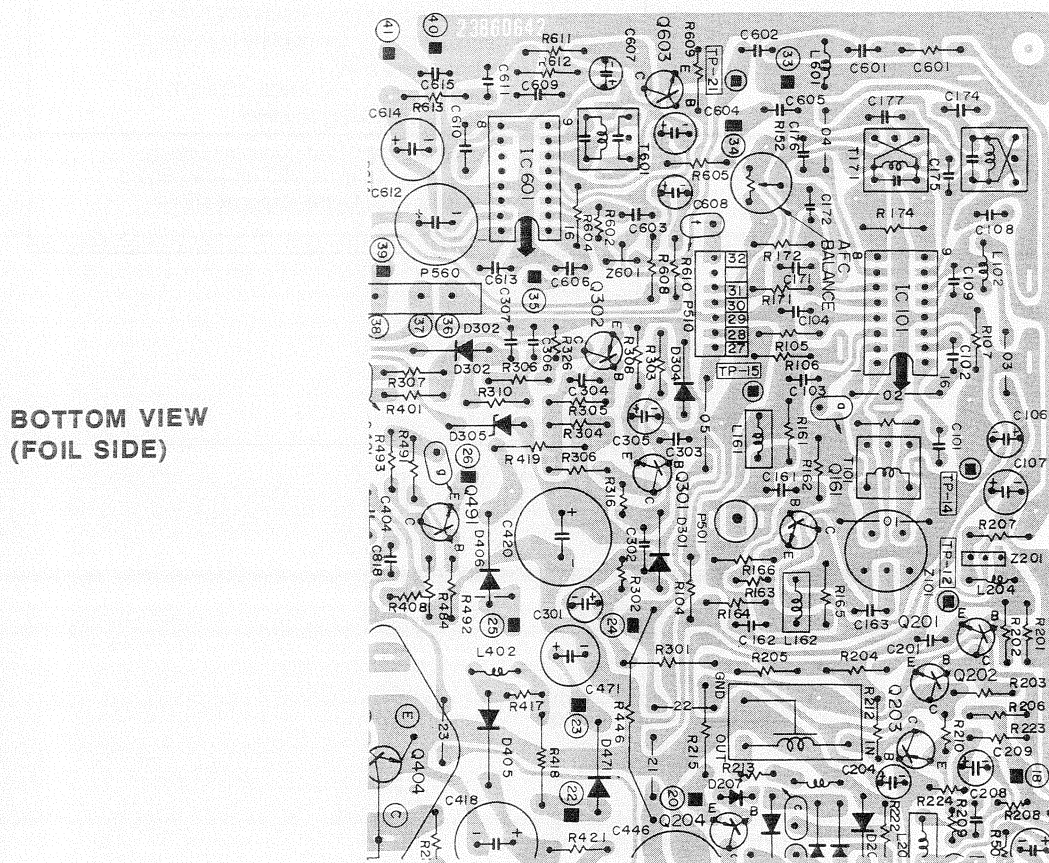
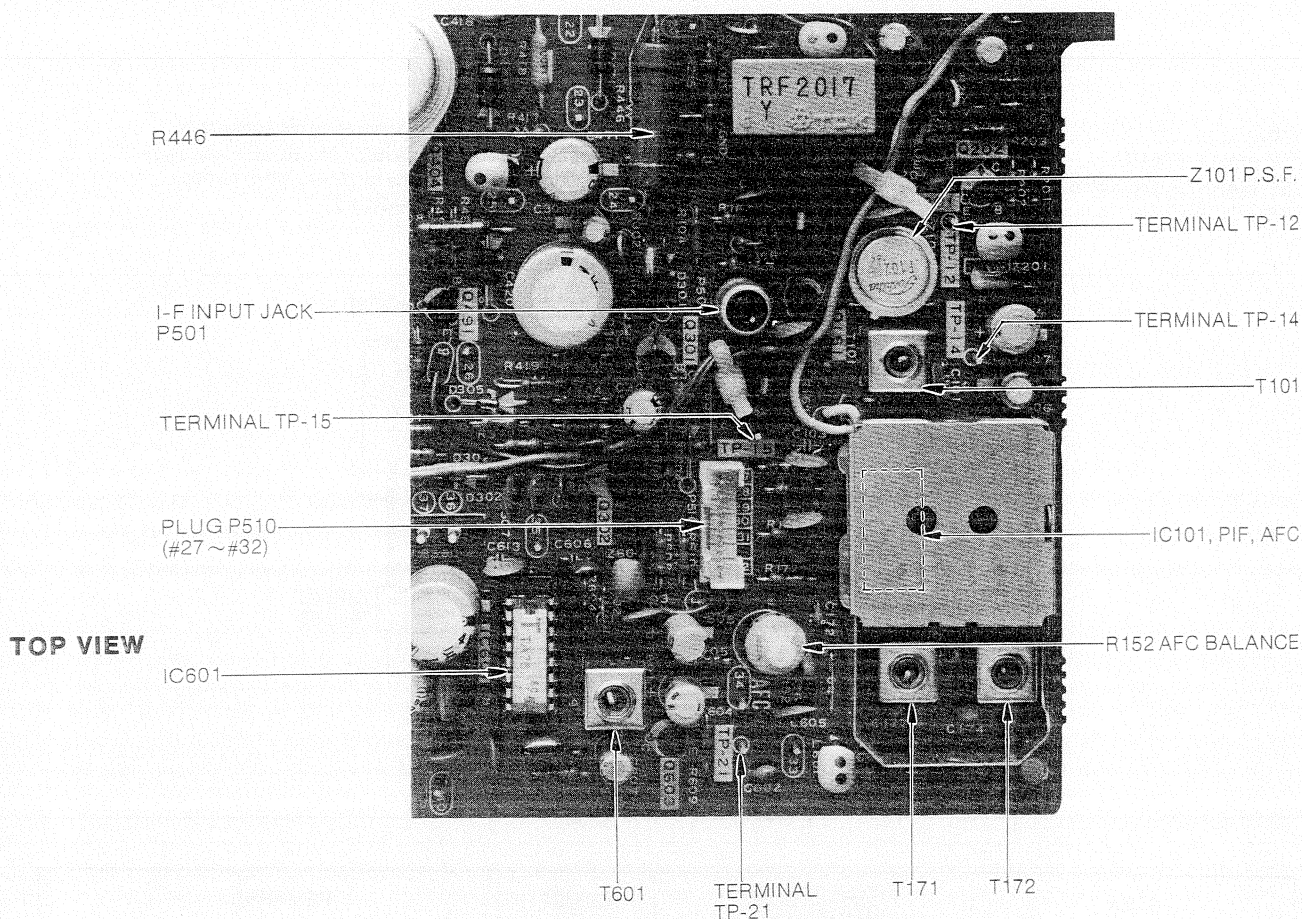


Figure 20. Picture I-F, AFC, and the Other Alignment Point

10. AFC ALIGNMENT

GENERAL..... Refer to figures 20 and 21 for alignment points and test equipments connection.
 PRELIMINARY STEPS..... Follow the same steps as given under PICTURE I-F SWEEP ALIGNMENT on page 22.
 SWEEP/MARKER GENERATOR..... Connect to the input jack "P501" on Main Board. Tune to 25–45 MHz sweep.
 OSCILLOSCOPE..... Connect direct probe to terminal #30 (P510) on Main Board.

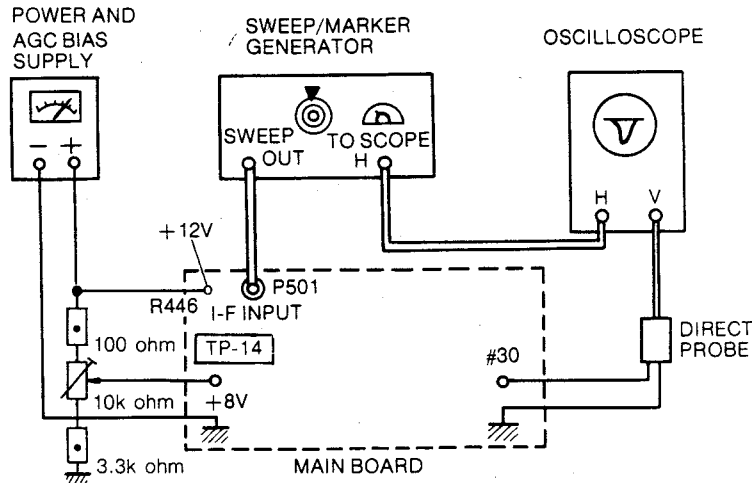


Figure 21. AFC Alignment

STEP	SWEEP/MARKER GENERATOR	ADJUST	REMARKS
1. AFC Balance	NO SIGNAL	R152	Set the AFC switch to the ON position. Connect the ground side of VTVM to Terminal #30 and hot side to Terminal #31 on Main Board. Adjust R152 (BALANCE ADJUST) for Zero volt reading on meter.
2. Primary f_0	38.9 MHz	T172	Remove the VTVM. Connect Direct Probe to Terminal #30 on Main Board. Adjust T172 for the response shown in figure 22.

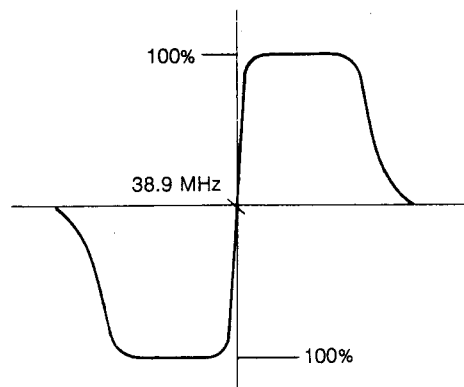


Figure 22. AFC Responses

11. COLOUR SYNC. AND PAL MATRIX ALIGNMENT

11-1. COLOUR SYNC.

Follow the same alignment as given under COLOUR SYNC. ADJUSTMENT on page 18.
Refer to figure 23 for alignment point.

11-2. PAL MATRIX

Follow the same alignment as given under PAL MATRIX ADJUSTMENT on page 18.
Refer to figure 23 of alignment points.

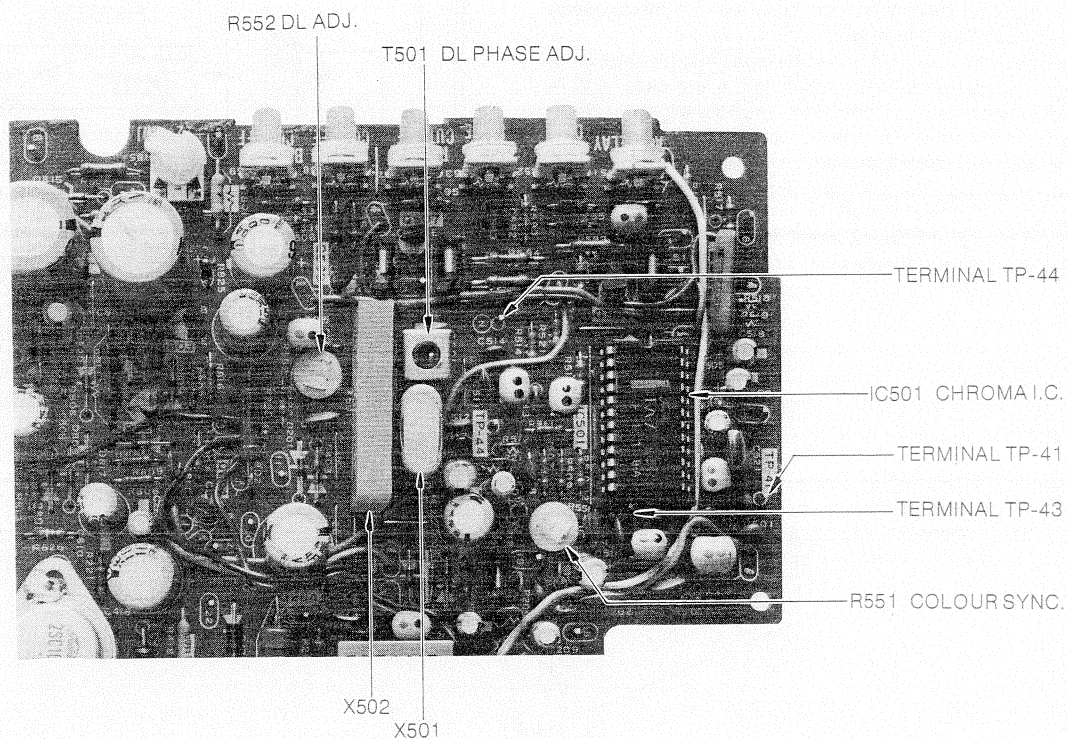


Figure 23. Colour Sync. and PAL Matrix Alignment Points

12. BATTERY PACK INFORMATION MODEL BP600

12-1. BATTERY INSTALLATION AND REPLACEMENT

1. Disconnect the battery pack power cord from the TV receiver.
2. Remove 4 screws (A) from the bottom and detach the bottom cover. (See figure 25.)
3. Disconnect the battery cords and replace the old batteries with new batteries in correct polarity.
 - Be sure to disconnect the cord with its metallic part holding. (See figure 26.)
 - Connect the battery cords to batteries with the ⊕ sides of batteries meeting the ⊕ indication in the case, and ⊖ sides meeting the ⊖ indication. Proceed the battery connection in numerical order. Install the top of batteries as indicated. (See figure 24.)
 - Take care the 2 long screws (B) never touches the battery terminals to prevent batteries from damage. Set the bottom cover and fasten 4 small screws (A).
 - Replace all four batteries with new ones at the same time.

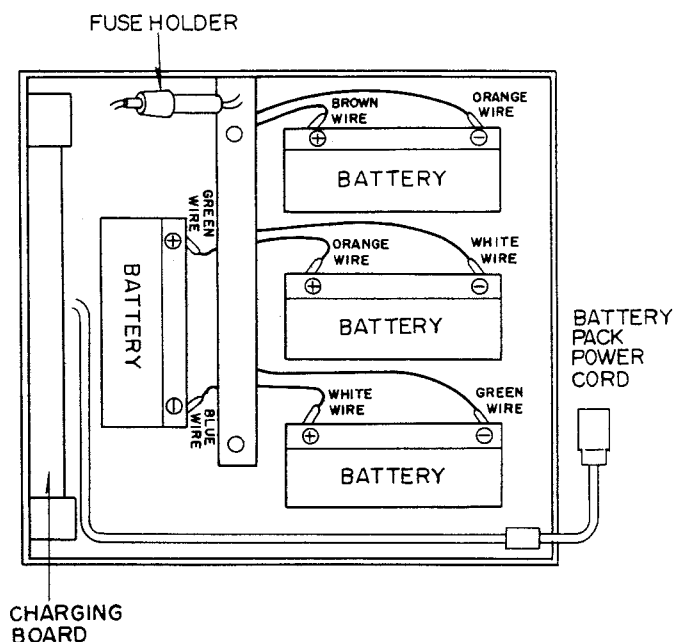


Figure 24.

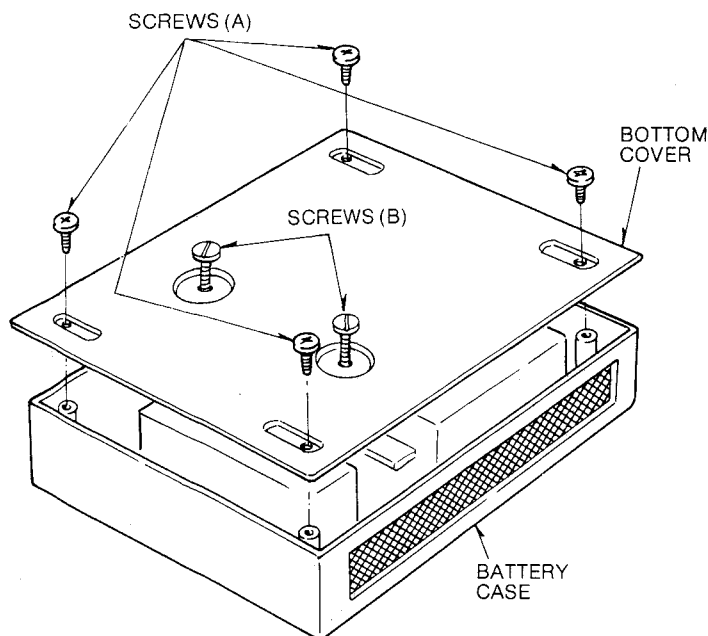


Figure 25.

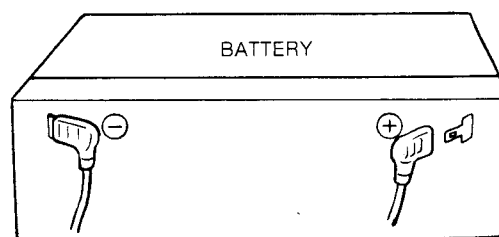


Figure 26.

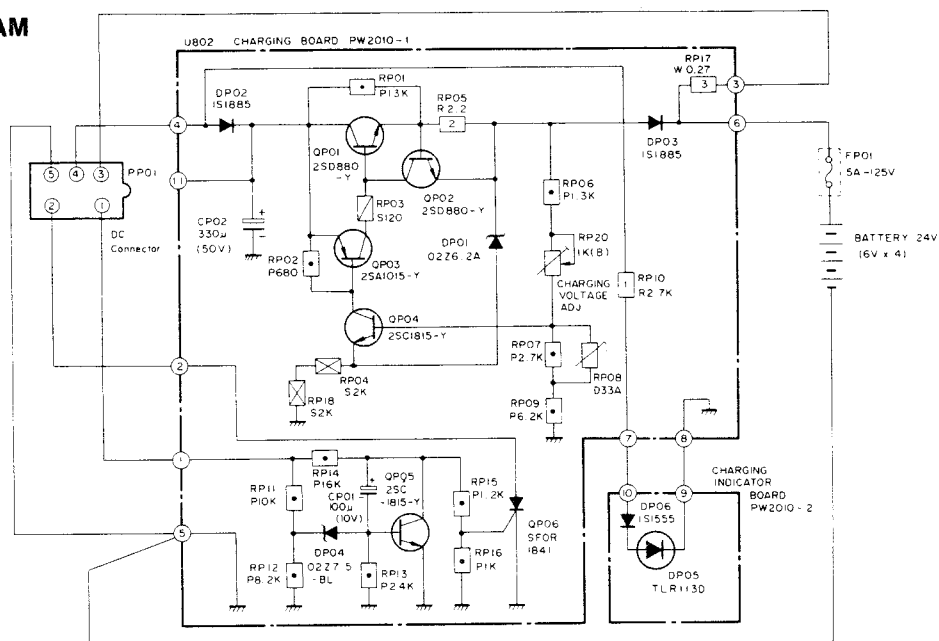
12-2. CHARGING VOLTAGE ADJUSTMENT

1. Remove the fuse holder from the battery pack and take out fuse (FP01).
2. Connect a resistor (560 ohm, 2W) between terminals 5 and 6.
3. Connect the AC power cord coming with the TV receiver to the household power outlet after connecting the battery pack power cord to the DC power socket (P803) of the receiver. Then turn off the TV receiver. ("CHARGING" condition.)
 - If the TV receiver is not available, apply +32.5 volts to terminal 4 on the charging board.
4. Connect a VTVM between terminal 6 and terminal 5 (ground) on the charging board.
5. Adjust the CHARGING VOLTAGE ADJ (RP20) on the charging board for +27.4 volt reading.

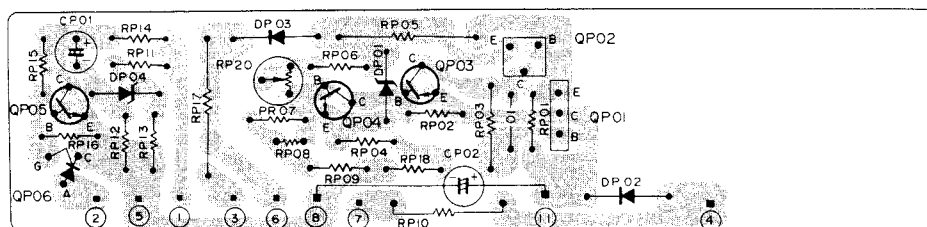
☆ Recommended Battery for Battery Pack (BP600).

1. YUASA BATTERY CO., LTD. Type, NP2.6—6
2. SONNENSCHNEIN Type, 3G × 3S

BP600 SCHEMATIC DIAGRAM



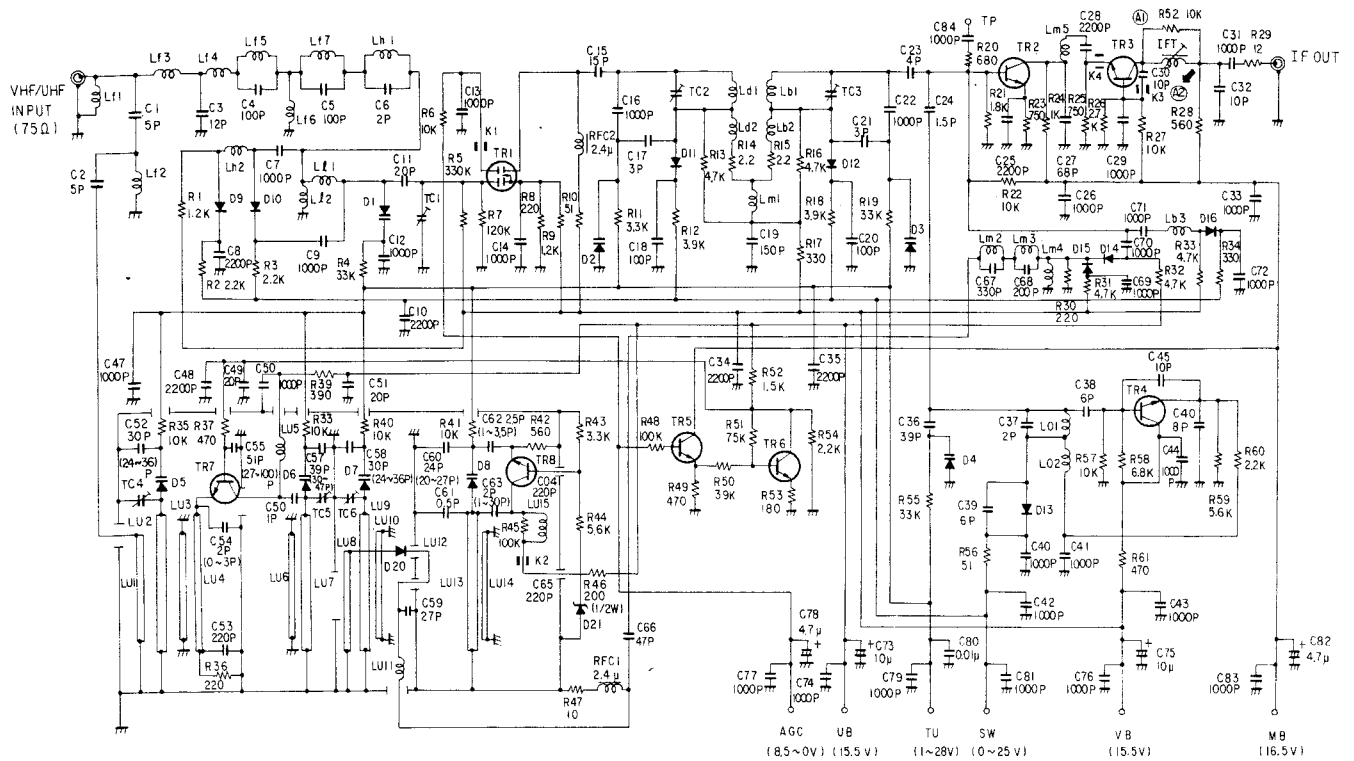
U802 CHARGING BOARD BOTTOM (FOIL) SIDE



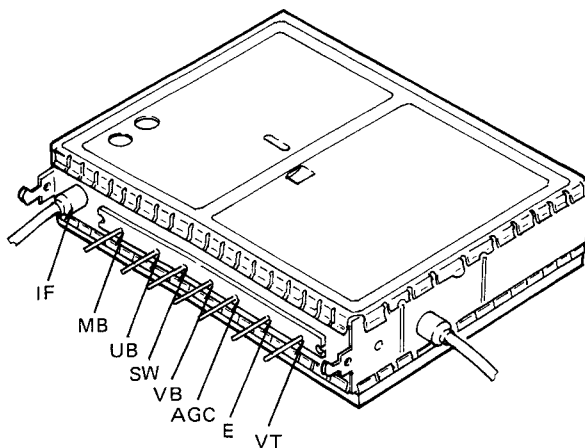
BATTERY PACK REPLACEMENT PARTS LIST

LOCATION NUMBER	PART NUMBER	DESCRIPTION	LOCATION NUMBER	PART NUMBER	DESCRIPTION
CAPACITORS			SEMICONDUCTORS		
CP01	24632101	EL, 100mfd, 10v	QP01, QP02	A6848520	NPN Transistor, 2SD880-Y
CP02	24616331	EL, 330mfd, 50v	QP03	A6534045	PNP Transistor, 2SA1015-Y
RESISTORS			QP04, QP05	A6317547	NPN Transistor, 2SC1815-Y
RP01	24360133	CF, 13k ohm, $\pm 5\%$, 1/8w	QP06	A7800720	SCR, SFOR1B41
RP02	24360681	CF, 680 ohm, $\pm 5\%$, 1/8w	DP01	A7286107	Zener Diode, 02Z6.2A
RP03	24946121	CC, 120 ohm, $\pm 10\%$, 1/2w	DP02	A7568521	Diode, 1S1885
RP04	24941202	CC, 2k ohm, $\pm 5\%$, 1/4w	DP03	A7568521	Diode, 1S1885
RP05	24994229	MF, 2.2 ohm, $\pm 10\%$, 2w	DP04	A7286510	Zener Diode, 02Z7.5BL FA-1
RP06	24360132	CF, 1300 ohm, $\pm 5\%$, 1/8w	DP05	A8600605	LED, TLR113D
RP07	24360272	CF, 2700 ohm, $\pm 5\%$, 1/8w	DP06	A7246711	Diode, 1S1555 (TV)
RP08	24000023	Thermistor, D33A	MISCELLANEOUS		
RP09	24360622	CF, 6200 ohm, $\pm 5\%$, 1/8w	U802	23139721	Charging Board Assembly, PW2010
RP10	24963272	OMF, 2700 ohm, $\pm 10\%$, 1w	PP01	23176297	Power Cord, 5P
RP11	24360103	CF, 10k ohm, $\pm 5\%$, 1/8w	FP01	23144945	Fuse, 5A
RP12	24360822	CF, 8200 ohm, $\pm 5\%$, 1/8w	FP01A	23109930	Fuse Holder with Lead Wire
RP13	24360242	CF, 2400 ohm, $\pm 5\%$, 1/8w		23925612	Battery Case
RP14	24360163	CF, 16k ohm, $\pm 5\%$, 1/8w		23847554	Holder, Power Cord
RP15	24360122	CF, 1200 ohm, $\pm 5\%$, 1/8w		23832699	Bottom Cover
RP16	24360102	CF, 1k ohm, $\pm 5\%$, 1/8w		23805985	Leg (4 used)
RP17	24523278	Cement, 0.27 ohm, 3w		23030016	Screw (2 used)
RP18	24941202	CC, 2k ohm, $\pm 5\%$, 1/4w		23097400	E-Washer, 4 mm (2 used)
RP20	24061916	VR, 1k ohm		23959175	Owner's Handbook
		CHARGING VOLTAGE ADJ.		23916615	Carton Box with Packing Material

13. VHF/UHF TUNER SCHEMATIC DIAGRAM

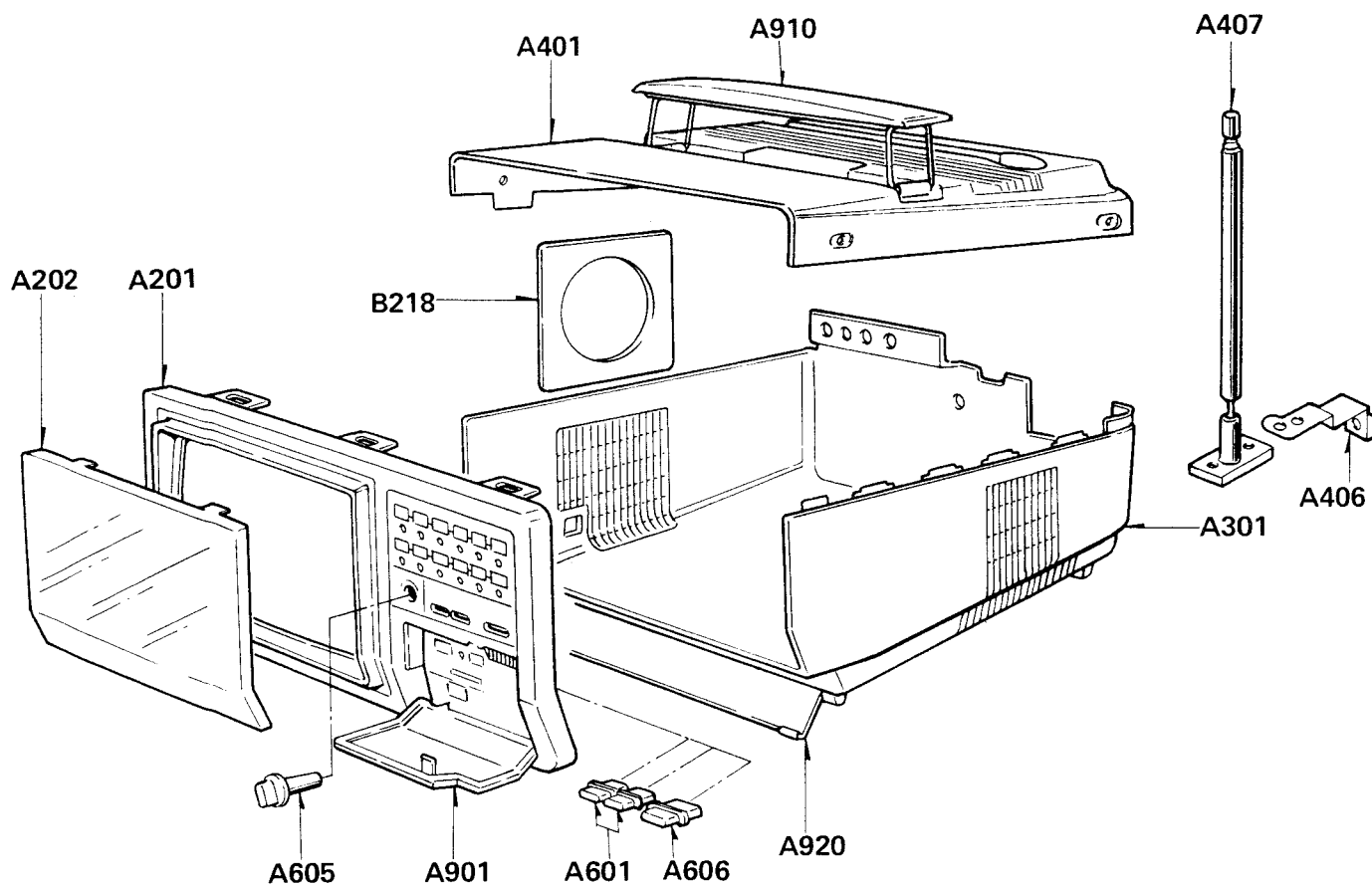


VHF/UHF TUNER ELECTRICAL REPAIR PARTS LIST



SCHEMATIC LOCATION	DESCRIPTION
TR1	VHF RF AMP., 3SK51
TR2	VHF MIX, 2SC1856
TR3	VHF MIX, 2SC717
TR4	VHF OSC., 2SC717
TR5	UHF AGC INVERTER, 2SC945
TR6	UHF AGC INVERTER, 2SC945
TR7	UHF RF AMP., 2SC1070
TR8	UHF OSC., 2SC288A
D1~D4	VHF TUNING, 1T18
D9~D13	VHF SWITCHING, 1SS85
D5~D8	UHF TUNING, 1T18
D20	UHF MIX, 1S1926
D21	STD VOLT., RD11EB
D14, D15	UHF SWITCHING, 1S2075K

14. CABINET EXPLODED VIEW AND REPLACEMENT PARTS LIST



Key No.	Part No.	Description
A202	23827891	Sunscreen
A201	23824354	Front Panel
B218	23814579	Rubber Cushion
A401	23832721	Top Cover with Handle
A910	23805991	Handle
A407	23124995	Telescopic Rod Aerial
A406	23877608	Contacting Plate, Telescopic Rod Aerial
A301	23832720	Bottom Cover
A920	23835957	Stand

Key No.	Part No.	Description
A606	23826586	Knob, POWER (PUSH-ON, PUSH-OFF)
A601	23826580	Knob, CHANNEL SHIFT (2 used)
A901	23803368	Control Door
A605	23826507	Knob, SOUND VOLUME

15. CHASSIS REPLACEMENT PARTS LIST

NOTE: The parts identified by shading and Δ mark are critical for safety. Replace only with part number specified.

Schematic Location	Part No.	Description
MAIN BOARD		
U902	23139784	Main Board Assembly, PW-1885-1
CAPACITORS		
C101,C103	24232103	CD, 0.01mfd, +80%, -20%, 50v
C104,C108		
C109,C161		
C162,C163		
C507,C516		
C517,C519		
C603,C605		
C611,C613		
C615		
C102	24232102	CD, 1000pf, +80%, -20%, 50v
C106	24692244	PF, 0.24mfd, $\pm 5\%$, 50v
C107	24635220	EL, 22mfd, 35v
C171,C172	24212102	CD, 1000pf, $\pm 10\%$, 50v
C503,C514		
C174	24436150	CD, 15pf, $\pm 5\%$, 50v
C175,C176	24436020	CD, 2pf, ± 0.25 pf, 50v
C177	24436010	CD, 1pf, ± 0.25 pf, 50v
C201,C512	24436200	CD, 20pf, $\pm 5\%$, 50v
C202	24436241	CD, 240pf, $\pm 5\%$, 50v
C204,C221	24636478	EL, 0.47mfd, 50v
C518		
C205,C209	24636010	EL, 1mfd, 50v
C301,C504		
C505,C607		
C206,C809	24635100	EL, 10mfd, 35v
C812		
C208	24436360	CD, 36pf, $\pm 5\%$, 50v
C222	24633101	EL, 100mfd, 16v
C302	24868333	PF, 0.033mfd, $\pm 10\%$, 50v
C303	24212471	CD, 470pf, $\pm 10\%$, 50v
C304	24602222	PF, 2200pf, $\pm 10\%$, 50v
C305,C820	24633220	EL, 22mfd, 16v
C821		
C306,C307	24692153	PF, 0.015mfd, $\pm 5\%$, 50v
C309	24867184	PF, 0.18mfd, $\pm 5\%$, 50v
C310	24692363	PF, 0.036mfd, $\pm 5\%$, 50v
C311	24617982	EL, 10mfd, 16v
C312,C810	24633470	EL, 47mfd, 16v
C313	24602273	PF, 0.027mfd, $\pm 10\%$, 50v
C314	24634330	EL, 33mfd, 25v
C315	24634331	EL, 330mfd, 25v
C332,C813	24635101	EL, 100mfd, 35v
C817		
C401	24602182	PF, 1800pf, $\pm 10\%$, 50v
C402	24602102	PF, 1000pf, $\pm 10\%$, 50v
C403,C508	24602223	PF, 0.022mfd, $\pm 10\%$, 50v
C509		
C404,C405	24602104	PF, 0.1mfd, $\pm 10\%$, 50v
C406,C419	24636339	EL, 3.3mfd, 50v
C814		

Schematic Location	Part No.	Description
C407	24095449	PF, 0.022mfd, $\pm 5\%$, 50v
C408	24867363	PF, 0.036mfd, $\pm 5\%$, 50v
C409	24867333	PF, 0.033mfd, $\pm 5\%$, 50v
C410	24602183	PF, 0.018mfd, $\pm 10\%$, 50v
C415	24829273	PF, 0.027mfd, $\pm 5\%$, 400v
C416	24085041	EL, 2.2mfd, 50v, NP
C418	24642100	EL, 10mfd, 160v
C420	24634471	EL, 470mfd, 25v
C446	24633331	EL, 330mfd, 16v
C447	24641100	EL, 10mfd, 100v
C471	24645229	EL, 2.2mfd, 315v
C501	24436180	CD, 18pf, $\pm 5\%$, 50v
C502	24436100	CD, 10pf, ± 0.25 pf, 50v
C506,C818	24212101	CD, 100pf, $\pm 10\%$, 50v
C510,C608	24636479	EL, 4.7mfd, 50v
C511	24353680	CD, 68pf, $\pm 5\%$, 50v
C513	24353220	CD, 22pf, $\pm 5\%$, 50v
C520	24212152	CD, 1500pf, $\pm 10\%$, 50v
C521	24692683	PF, 0.068mfd, $\pm 5\%$, 50v
C591	24212681	CD, 680pf, $\pm 10\%$, 50v
C592	24212821	CD, 820pf, $\pm 10\%$, 50v
C593	24212561	CD, 560pf, $\pm 10\%$, 50v
C601,C602	24436470	CD, 47pf, $\pm 5\%$, 50v
C604	24633330	EL, 33mfd, 16v
C606,C815	24692102	PF, 1000pf, $\pm 5\%$, 50v
C609	24692103	PF, 0.01mfd, $\pm 5\%$, 50v
C610	24602563	PF, 0.056mfd, $\pm 10\%$, 50v
C612	24634221	EL, 220mfd, 25v
C614	24634470	EL, 47mfd, 25v
C806	24636101	EL, 100mfd, 50v
C807,C816	24635102	EL, 1000mfd, 35v
C808	24634101	EL, 100mfd, 25v
C811	24692392	PF, 3900pf, $\pm 5\%$, 50v
C819	24603683	PF, 0.068mfd, $\pm 10\%$, 100v
RESISTORS		
R101	24360182	CF, 1.8k ohm, $\pm 5\%$, 1/8w
R103,R162	24360102	CF, 1k ohm, $\pm 5\%$, 1/8w
R307,R318		
R401,R601		
R604		
R104,R409	24360393	CF, 39k ohm, $\pm 5\%$, 1/8w
R826		
R105,R164	24360221	CF, 220 ohm, $\pm 5\%$, 1/8w
R207		
R106,R173	24360104	CF, 100k ohm, $\pm 5\%$, 1/8w
R220,R225		
R520	24360824	CF, 820k ohm, $\pm 5\%$, 1/8w
R107		
R151	24061888	VR, 5k ohm, 0.3w, B-Type, AGC Delay
R152	24061257	VR, 1M ohm, 0.15w, B-Type, AFC Balance

NOTE: The parts identified by shading and Δ mark are critical for safety. Replace only with part number specified.

Schematic Location	Part No.	Description	Schematic Location	Part No.	Description
R161,R202 } R415	24360101	CF, 100 ohm, $\pm 5\%$, 1/8w	R317	24962110	OMF, 11 ohm, $\pm 5\%$, 1/2w
R163	24380562	CF, 5.6k ohm, $\pm 5\%$, 1/8w	R322	24962680	OMF, 68 ohm, $\pm 5\%$, 1/2w
R165,R809	24360471	CF, 470 ohm, $\pm 5\%$, 1/8w	R323	24360829	CF, 8.2 ohm, $\pm 5\%$, 1/8w
R166	24360270	CF, 27 ohm, $\pm 5\%$, 1/8w	R324	24360150	CF, 15 ohm, $\pm 5\%$, 1/8w
R171,R172 } R509	24360122	CF, 1.2k ohm, $\pm 5\%$, 1/8w	R325	24982369	MF, 3.6 ohm, $\pm 5\%$, 1/2w
R174	24360392	CF, 3.9k ohm, $\pm 5\%$, 1/8w	R326,R518 } R519	24380272	CF, 2.7k ohm, $\pm 5\%$, 1/8w
R201,R304 } R327	24360222	CF, 2.2k ohm, $\pm 5\%$, 1/8w	R329	24945681	CC, 680 ohm, $\pm 10\%$, 1/4w
R203,R222 } R534,R535 } R536	24360472	CF, 4.7k ohm, $\pm 5\%$, 1/8w	R331,R337	24000023	Thermistor, D33A
R204,R306 } R517	24360272	CF, 2.7k ohm, $\pm 5\%$, 1/8w	R335	24000941	FR, 150 ohm, $\pm 5\%$, 1/4w
R205,R406 } R411,R413	24360911	CF, 910 ohm, $\pm 5\%$, 1/8w	R402	24360201	CF, 200 ohm, $\pm 5\%$, 1/8w
R206	24360361	CF, 360 ohm, $\pm 5\%$, 1/8w	R403,R612	24360123	CF, 12k ohm, $\pm 5\%$, 1/8w
R208	24380101	CF, 100 ohm, $\pm 5\%$, 1/8w	R404	24360183	CF, 18k ohm, $\pm 5\%$, 1/8w
R209	24380271	CF, 270 ohm, $\pm 5\%$, 1/8w	R405	24360362	CF, 3.6k ohm, $\pm 5\%$, 1/8w
R210	24380301	CF, 300 ohm, $\pm 5\%$, 1/8w	R408	24963103	OMF, 10k ohm, $\pm 5\%$, 1w
R211,R217 } R417,R602	24380102	CF, 1k ohm, $\pm 5\%$, 1/8w	R410	24360100	CF, 10 ohm, $\pm 5\%$, 1/8w
R212,R803	24360162	CF, 1.6k ohm, $\pm 5\%$, 1/8w	R412	24360200	CF, 20 ohm, $\pm 5\%$, 1/8w
R213	24380162	CF, 1.6k ohm, $\pm 5\%$, 1/8w	R414	24360301	CF, 300 ohm, $\pm 5\%$, 1/8w
R215	24962681	OMF, 680 ohm, $\pm 5\%$, 1/2w	R416	24964391	OMF, 390 ohm, $\pm 5\%$, 2w
R216,R482	24360241	CF, 240 ohm, $\pm 5\%$, 1/8w	R418	24531100	FR, 10 ohm, $\pm 5\%$, 1/2w
R218	24380104	CF, 100k ohm, $\pm 5\%$, 1/8w	R419	24982439	MF, 4.3 ohm, $\pm 5\%$, 1/2w
R221	24941822	CC, 8.2k ohm, $\pm 5\%$, 1/4w	R420	24360430	CF, 43 ohm, $\pm 5\%$, 1/8w
R223,R493	24360433	CF, 43k ohm, $\pm 5\%$, 1/8w	R421	24941104	CC, 100k ohm, $\pm 5\%$, 1/4w
R224	24380243	CF, 24k ohm, $\pm 5\%$, 1/8w	R446	24965390	OMF, 39 ohm, $\pm 5\%$, 3w
R226,R824	24360820	CF, 82 ohm, $\pm 5\%$, 1/8w	R447,R461	24982479	MF, 4.7 ohm, $\pm 5\%$, 1/2w
R252,R253	24061890	VR, 1k ohm, 0.3w, B-Type R252: GREEN DRIVE R253: BLUE DRIVE	R485	24963102	OMF, 1k ohm, $\pm 5\%$, 1w
R265,R308 } R320,R321	24360751	CF, 750 ohm, $\pm 5\%$, 1/8w	R491	24378134	CF, 130k ohm, $\pm 2\%$, 1/8w
R301	24917102	CF, 1k ohm, $\pm 5\%$, 1/8w	R492	24378273	CF, 27k ohm, $\pm 2\%$, 1/8w
R302	24380564	CF, 560k ohm, $\pm 5\%$, 1/8w	R502	24360133	CF, 13k ohm, $\pm 5\%$, 1/8w
R303,R328 } R407	24360332	CF, 3.3k ohm, $\pm 5\%$, 1/8w	R503	24360334	CF, 330k ohm, $\pm 5\%$, 1/8w
R305,R336	24360562	CF, 5.6k ohm, $\pm 5\%$, 1/8w	R504	24360563	CF, 56k ohm, $\pm 5\%$, 1/8w
R309,R511 } R608,R806 } R808	24360822	CF, 8.2k ohm, $\pm 5\%$, 1/8w	R505	24380333	CF, 33k ohm, $\pm 5\%$, 1/8w
R310,R319 } R332,R605 } R804	24360103	CF, 10k ohm, $\pm 5\%$, 1/8w	R506	24360331	CF, 330 ohm, $\pm 5\%$, 1/8w
R311,R330 } R501,R514 } R515	24360821	CF, 820 ohm, $\pm 5\%$, 1/8w	R507	24360273	CF, 27k ohm, $\pm 5\%$, 1/8w
R313	24360623	CF, 62k ohm, $\pm 5\%$, 1/8w	R508	24380273	CF, 27k ohm, $\pm 5\%$, 1/8w
R314,R494	24360473	CF, 47k ohm, $\pm 5\%$, 1/8w	R510	24360823	CF, 82k ohm, $\pm 5\%$, 1/8w
R316	24380514	CF, 510k ohm, $\pm 5\%$, 1/8w	R512	24380821	CF, 820 ohm, $\pm 5\%$, 1/8w
			R513	24380511	CF, 510 ohm, $\pm 5\%$, 1/8w
			R516	24360391	CF, 390 ohm, $\pm 5\%$, 1/8w
			R521	24360153	CF, 15k ohm, $\pm 5\%$, 1/8w
			R531,R532 } R533	24360512	CF, 5.1k ohm, $\pm 5\%$, 1/8w
			R551	24061138	VR, 4.7k ohm, 0.15w, B-Type, COLOUR SYNC.
			R552	24061132	VR, 470 ohm, 0.15w, B-Type, Delay Adjust
			R557,R558 } R559	24061887	VR, 10k ohm, 0.3w, B-Type, R557: RED CUT OFF R558: GREEN CUT OFF R559: BLUE CUT OFF
			R592,R594 } R596	24962203	OMF, 20k ohm, $\pm 5\%$, 1/2w
			R593,R595	24360271	CF, 270 ohm, $\pm 5\%$, 1/8w

NOTE: The parts identified by shading and Δ mark are critical for safety. Replace only with part number specified.

Schematic Location	Part No.	Description	Schematic Location	Part No.	Description
R609,R610	24360223	CF, 22k ohm, $\pm 5\%$, 1/8w	T601	23252970	Coil, TRF6405, SIF
R611	24360203	CF, 20k ohm, $\pm 5\%$, 1/8w	T802	23224994	Transformer, TPW3011, Converter Drive
R613	24941472	CC, 4.7k ohm, $\pm 5\%$, 1/4w	T803	23213376	Transformer, TPW3012, Converter
R614	24964101	OMF, 100 ohm, $\pm 5\%$, 2w	SEMICONDUCTORS		
R801	24531121	FR, 120 ohm, $\pm 5\%$, 1/2w	IC101	B0354710	Integrated Circuit, TA7607AP, PIF, AFC
R802	24964301	OMF, 300 ohm, $\pm 5\%$, 2w	IC501	B0318931	Integrated Circuit, TA7193P, CHROMA
R805	24801332	CF, 3.3k ohm, $\pm 2\%$, 1/8w	IC601	B0355850	Integrated Circuit, TA7620P, SIF, Audio
R807	24360242	CF, 2.4k ohm, $\pm 5\%$, 1/8w	Q161	A6708871	NPN Transistor, 2SC388ATM Picture I-F Amp
R810	24360202	CF, 2k ohm, $\pm 5\%$, 1/8w	Q201,Q202	A6317547	NPN Transistor, 2SC1815-Y Q201: 1st Video Amp Q202: 2nd Video Amp Q301: Sync Sep. Q303: Vert. OSC. Q803: Error Amp Q804: Pulse Amp Q807: Converter Drive
R811	24360511	CF, 510 ohm, $\pm 5\%$, 1/8w	Q301,Q303		
R812	24360561	CF, 560 ohm, $\pm 5\%$, 1/8w	Q803,Q804		
R813	24941512	CC, 5.1k ohm, $\pm 5\%$, 1/4w	Q807		
R816	24360682	CF, 6.8k ohm, $\pm 5\%$, 1/8w	Q203,Q401	A6534045	PNP Transistor, 2SA1015-Y Q203: 3rd Video Amp Q401: Horiz. OSC. Q805: Shaping
R817	24963102	OMF, 1k ohm, $\pm 5\%$, 1w	Q805		
R818	24360124	CF, 120k ohm, $\pm 5\%$, 1/8w	Q204,Q802	A6509141	PNP Transistor, 2SA562TM-Y Q204: 4th Video Amp Q802: Volt Regu. Amp.
R820	24801111	CF, 110 ohm, $\pm 2\%$, 1/8w	Q302	A6534021	PNP Transistor, 2SA1015-O
R821	24946681	CC, 680 ohm, $\pm 10\%$, 1/2w	Q304	A6324922	NPN Transistor, 2SC2229-O, Vert. Amp
R822	24946331	CC, 330 ohm, $\pm 10\%$, 1/2w	Q306	A6319550	NPN Transistor, 2SC2073, Vert. Output
R823	24994159	MF, 1.5 ohm, $\pm 10\%$, 2w	Q307	A6532320	PNP Transistor, 2SA940, Vert. Output
R825	24000036	Thermistor, 200 ohm, $\pm 20\%$	Q402	A6319302	NPN Transistor, 2SC1959-Y, Horiz Drive
R827	24360151	CF, 150 ohm, $\pm 5\%$, 1/8w	Q404	A6314000	NPN Transistor, 2SC1617, Horiz. Output
R828	24942361	CC, 360 ohm, $\pm 5\%$, 1/2w	Q491	A6317526	NPN Transistor, 2SC1815-O, PROTECTOR
R851	24061988	VR, 200 ohm, 1/2w, B-Type, +22V ADJ.	Q505,Q507	A6324942	NPN Transistor, 2SC2229-Y Q505: RED OUT Q507: GREEN OUT Q509: BLUE OUT
			Q509		
COILS AND TRANSFORMERS			Q603	A6317567	NPN Transistor, 2SC1815-GR, Sound Defeat
L102,L202	23283569	Coil, PL-5.6, Peaking	D201,D202	A7246711	Diode, 1S1555 (TV) D201: ABL D202,D403: Protector D204,D205: Pulse Clamper D206,D301: Clamper
L161	23261986	Coil, TRF9220, R-F Choke	D204,D205		
L162	23221047	Coil, TRF9201, R-F Choke	D206,D207		
L201	23283560	Coil, PL-56, Peaking	D301,D302		
L203	23252886	Coil, PL-2.1, Peaking	D303,D304		
L204	23283150	Coil, PL-15, Peaking			
L401	23225699	Coil, TLN1023, Horiz. Hold			
L402	23283271	Coil, PL-270, Peaking			
L403	23261974	Coil, HC5-035, Choke			
L461	23271001	Coil, PL-27, Choke			
L501	23283330	Coil, PL-33, Peaking			
L502	23283200	Coil, PL-20, Peaking			
L503	23283101	Coil, PL-100, Peaking			
L504	23283102	Coil, PL-1000, Peaking			
L505	23283829	Coil, PL-8.2, Peaking			
L506	23283682	Coil, PL-6800, Peaking			
L510,L511	23261047	Coil, AZ-9246A, Choke			
L512					
L601	23283120	Coil, PL-12, Peaking			
L801,L802	23261975	Coil, TRF9229, Choke			
L803	23221074	Coil, TLN1015P, Choke			
T101	23262880	Transformer, TRF-1446 P.S.F. Matching			
T171,T172	23262881	Transformer, TRF1445, T171: PIF Detector T172: AFC			
T401	23224996	Transformer, TLN1028, H. Drive			
T501	23270999	Coil, TRF5402, Delay Phase Adjust			

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Schematic Location	Part No.	Description
D306,D401, D402,D403 D501,D805 D806,D808 D809,D810 D814,D816 D817,D818	A7246711	D207: Temp. Clamper D302: Pulse Sharp D303,D304: Bias D306: Protector D401,D402: AFC Phase DET. D501: Pulse Gate D805: APF Switch D806,D808: D809,D810: } Switch D814,D816: D817,D818
D305 D404 D405,D812	A7285900 A7289800 23115889	Zener Diode, 02Z5.6A, STD. Volt Diode, 1S2756, Damper Diode, RU1 D405: 110v Rect. D812: Rect.
D406,D471	A7978850	Diode, S5295G D406: 16.5v Rect. D471: 130v Rect.
D407 D807 D811 D813 D815	23115888 A7568521 A7246602 A7509151 A7287500	Diode, RU1A, 55v Rect. Diode, 1S1885, Switch Diode, 1S1553 (TV), Switch Diode, 1GH11F, 22v Rect. Zener Diode, 02Z12A, STD. Volt
MISCELLANEOUS		
P560 Q101A,Q601A Q501A R335A W201 X501	23164729 23116947 23116918 23160994 23250989 23153006	Plug, 3P IC Socket, 16P IC Socket, 24P Pin Terminal Delay Line, TRF2017 Crystal, 4.43 MHz
X502 Z101	23153993 23107992	or IH Delay Line Filter, F1024, Picture I-F Surface Acoustic Wave Filter
Z201 Z501 Z601	23107972 23134992 23107008	Ceramic Video Trap, 5.5 MHz CRA393 Ceramic Filter, 5.5 MHz
FAIL SAFE BOARD		
CAPACITORS		
C431 C473 C474 C475	24095538 24636478 24633100 24232103	PF, 0.82mfd, $\pm 10\%$, 100v EL, 0.47mfd, 50v EL, 10mfd, 16v CD, 0.01mfd, $+80\%$, -20% , 50v
RESISTORS		
R472 R473 R474 R475 R476,R477 R478,R479 R481	24327513 24327823 24327123 24378624 24360104 24360103 24378683	MF, 51k ohm, $\pm 1\%$, 1/4w MF, 82k ohm, $\pm 1\%$, 1/4w MF, 12k ohm, $\pm 1\%$, 1/4w CF, 620k ohm, $\pm 2\%$, 1/8w CF, 100k ohm, $\pm 5\%$, 1/8w CF, 10k ohm, $\pm 5\%$, 1/8w CF, 68k ohm, $\pm 2\%$, 1/8w

Schematic Location	Part No.	Description
R483 R484	24963751 24360392	OMF, 750 ohm, $\pm 5\%$, 1/2w CF, 3.9k ohm, $\pm 5\%$, 1/8w
SEMICONDUCTORS		
Q471,Q472 Q473 D472	A6534021 A6317526 A7287500	PNP Transistor, 2SA1015-O NPN Transistor, 2SC1815-O Zener Diode, 1S2119A
POWER-1 BOARD		
U801	23139693	Power-1 Board Assembly, PW-2032
CAPACITORS		
C801,C802 C803,C804 C805 C880	24232472 24636222 24095528	CD, 0.01mfd, $+80\%$, -20% , 50v EL, 2200mfd, 50v MP, 0.1mfd, $\pm 20\%$, 125v
RESISTOR		
R880	24946335	CC, 3.3M ohm, $\pm 10\%$, 1/2w
SEMICONDUCTORS		
D801,D802 D803,D804	A7580110	Diode, 1R5GZ61 D801~D804: Power Rect. $\times 4$
MISCELLANEOUS		
D801A,D802A D803A,D804A	23160994	Pin Terminal
Δ F801 F801A,F802A F803A	23144969 23165102	Fuse, 630MAT Fuse Holder for P.C. Board
Δ F802 Δ F803	23144970 23144920	Fuse, 1.6AT Fuse, 5.0AT
P580	23164725	Plug, 2P
CRT DRIVE BOARD		
U901	23139794	CRT Drive Board Assembly, PW-1874
CAPACITORS		
C412 C902	24095480 24210331	PF, 0.001mfd, $\pm 10\%$, 1.25kv CF, 330pf, $\pm 20\%$, 1kv
RESISTORS		
R423 R901,R902 R903 R905 R908,R911 R912 R951	24946274 24946272 24946334 24946564 24945399 24060761	CC, 270k ohm, $\pm 10\%$, 1/2w CC, 2.7k ohm, $\pm 10\%$, 1/2w CC, 330k ohm, $\pm 10\%$, 1/2w CC, 560k ohm, $\pm 10\%$, 1/2w CC, 3.9 ohm, $\pm 10\%$, 1/4w VR, 2M ohm, 0.6w, B-Type, SCREEN
COILS AND TRANSFORMERS		
T901	23224991	Transformer, TLN2036, Heater
MISCELLANEOUS		
V901A Z901,Z902 Z903 Z904 Z905	23116839 23140607	CRT Socket, 9P Spark Gap, 0.7 — 1.5kv

NOTE: The parts identified by shading and Δ mark are critical for safety. Replace only with part number specified.

Schematic Location	Part No.	Description
SELECTOR BOARD		
UA01	23139733	Selector Board Assembly, PW-1991
CAPACITORS		
CA01,CC01 CA02 CA03,CA04 CA05,CA06 CA11,CA12 CB41,CB42 CC03,CC04 CC05,CE02 CE03 CA07 CA09,CA10 CB01 CB21,CB22 CB23,CB24 CB25 CB27,CB28 CC02 CC06 CC07 CC08 CE01 CE04 CE05	24634470 24602472 24353121 24232103 24636010 24602183 24085031 24436330 24617999 24617998 24580001 24635100 24636100 24602333 24602104 24636229 24635101 24636220	EL, 47mfd, 25v PF, 0.0047mfd, $\pm 10\%$, 50v CD, 120pf, $\pm 5\%$, 50v CD, 0.01mfd, $+80\%$, -20% , 50v EL, 1mfd, 50v PF, 0.018mfd, $\pm 10\%$, 50v EL, 1mfd, 25v, NP CD, 33pf, $\pm 5\%$, 50v EL, 0.47mfd, 50v EL, 1mfd, 50v EL, 6.8mfd, 35v EL, 10mfd, 35v EL, 10mfd, 50v PF, 0.033mfd, $\pm 10\%$, 50v PF, 0.1mfd, $\pm 10\%$, 50v EL, 2.2mfd, 50v EL, 100mfd, 35v EL, 22mfd, 50v
RESISTORS		
RA13 RA15 RA16 RA19,RB08 RA20,RB07 RA22 RA23 RA24 RA25,RA26 RA27,RA28 RA29 RB01,RB29 RB02,RB41 RB03,RB04 RD51,RD53 RB05,RB06 RB09 RB10 RB21,RB22 RB23 RB24 RB25,RB27 RB26,RB28 RB30,RB31 RB32	24963680 24380562 24360221 24360183 24380183 24360153 24380153 24380224 24380472 24360472 24942272 24380103 24360103 24380104 24380473 24360333 24942685 24380433 24380163 24380682 24380113 24380273 24380102 24380223	OMF, 68 ohm, $\pm 5\%$, 1w CF, 5.6k ohm, $\pm 5\%$, 1/8w CF, 220 ohm, $\pm 5\%$, 1/8w CF, 18k ohm, $\pm 5\%$, 1/8w CF, 18k ohm, $\pm 5\%$, 1/8w CF, 15k ohm, $\pm 5\%$, 1/8w CF, 15k ohm, $\pm 5\%$, 1/8w CF, 220k ohm, $\pm 5\%$, 1/8w CF, 4.7k ohm, $\pm 5\%$, 1/8w CF, 4.7k ohm, $\pm 5\%$, 1/8w CC, 2.7k ohm, $\pm 5\%$, 1/2w CF, 10k ohm, $\pm 5\%$, 1/8w CF, 10k ohm, $\pm 5\%$, 1/8w CF, 100k ohm, $\pm 5\%$, 1/8w CF, 47k ohm, $\pm 5\%$, 1/8w CF, 33k ohm, $\pm 5\%$, 1/8w CC, 6.8M ohm, $\pm 5\%$, 1/2w CF, 43k ohm, $\pm 5\%$, 1/8w CF, 16k ohm, $\pm 5\%$, 1/8w CF, 6.8k ohm, $\pm 5\%$, 1/8w CF, 11k ohm, $\pm 5\%$, 1/8w CF, 27k ohm, $\pm 5\%$, 1/8w CF, 1k ohm, $\pm 5\%$, 1/8w CF, 22k ohm, $\pm 5\%$, 1/8w

Schematic Location	Part No.	Description
RB33 RB42 RE01 RE02 RE03 RE04 RE05 RE07 RE08 RE10	24380512 24380123 24962332 24380363 24380154 24963242 24962183 24962102 24962152 24982829	CF, 5.1k ohm, $\pm 5\%$, 1/8w CF, 12k ohm, $\pm 5\%$, 1/8w OMF, 3.3k ohm, $\pm 5\%$, 1/2w CF, 36k ohm, $\pm 5\%$, 1/8w CF, 150k ohm, $\pm 5\%$, 1/8w OMF, 2.4k ohm, $\pm 5\%$, 1w OMF, 18k ohm, $\pm 5\%$, 1/2w OMF, 1k ohm, $\pm 5\%$, 1/2w OMF, 1.5k ohm, $\pm 5\%$, 1/2w MF, 8.2 ohm, $\pm 5\%$, 1/2w
COILS AND TRANSFORMERS		
LA01 LA02	23283220 23261047	Coil, PL-22, Peaking Coil, AZ-9246A, Choke
SEMICONDUCTORS		
ICA01 ICA02 ICC01 ICC02 QB03,QB04 QB24,QB41 QB21,QB22 QB23 QE01 QE02 DA14,DA15 DA16,DB01 DB02,DB03 DB04,DE02 DE01 DE03 DE04	B0410022 B0324721 B0428410 B0355810 A6317547 A6708371 A6534045 A6319550 A6531240 A7246711 23115878 23115889 A7286700	LSI, TC9002AP, Digital Controller Integrated Circuit, TA7315BP, Tuner Control Integrated Circuit, TMM841P, Memory Integrated Circuit, TA7619AP, Memory Control NPN Transistor, 2SC1815-Y, QB03,QB04: AFC Sw. QB24: Volt Amp. QB41: Sound Muting NPN Transistor, 2SC383TM QB21, QB22: Pulse Amp PNP Transistor, 2SA1015-Y NPN Transistor, 2SC2073 PNP Transistor, 2SA818-Y Diode, 1S1555 (TV) DA14,DA15,DA16,DB01, DB02,DB03,DB04,DE02 } Switch Zener Diode, μ PC574JC: STD Volt Diode, RU1, Switch Zener Diode, 02Z8.2A: Protector
MISCELLANEOUS		
P521 QA01A QC01A QC02A ZA01,ZA02 ZA04,ZA05 ZA06	23164795 23116843 23116948 23116947 24000943 24094578	Plug, 15P IC Socket, 42P IC Socket, 14P IC Socket, 16P Resistor Block, 470 ohm $\times 6$, 1/8w CD, 0.01mfd $\times 6$, $+80\%$, -20% , 50v
CONTROL BOARD		
U903	23139792	Control Board Assembly, PW-1876
CAPACITOR		
C251	24633101	EL, 100mfd, 16v
RESISTORS		
R254	24061858	VR, 500 ohm, 1/5w, B-Type, CONTRAST

NOTE: The parts identified by shading and Δ mark are critical for safety. Replace only with part number specified.

Schematic Location	Part No.	Description
R255	24060653	VR, 5k ohm, 1/5w, B-Type, BRIGHTNESS
R256	24061914	VR, 5k ohm, 0.3w, B-Type, SUB-BRIGHTNESS
R261,R362	24360133	CF, 13k ohm, $\pm 5\%$, 1/8w
R262	24360823	CF, 82k ohm, $\pm 5\%$, 1/8w
R263	24360184	CF, 180k ohm, $\pm 5\%$, 1/8w
R264	24360510	CF, 51 ohm, $\pm 5\%$, 1/8w
R351	24061855	VR, 5k ohm, 1/5w, B-Type, VERT. HOLD
R352	24061913	VR, 10k ohm, 0.3w, B-Type, VERT. HEIGHT
R361	24360243	CF, 24k ohm, $\pm 5\%$, 1/8w
R555	24061854	VR, 10k ohm, 1/5w, B-Type COLOUR
R561	24360302	CF, 3k ohm, $\pm 5\%$, 1/8w
R562	24360472	CF, 4.7k ohm, $\pm 5\%$, 1/8w
ET CONTROL BOARD		
UA03	23139790	ET Control Board Assembly, PW-1878
CAPACITOR		
CA20	24602393	PF, 0.039mfd, $\pm 10\%$, 50v
RESISTORS		
RA06	24945122	CC, 1.2k ohm, $\pm 10\%$, 1/4w
RA18	24941102	CC, 1k ohm, $\pm 5\%$, 1/4w
RA50	24060764	VR, 100k ohm, 1/10w, B-Type, TUNING (with SA14 Band Switch)
SEMICONDUCTORS		
DA03,DA04	A7246711	Diode, 1S1555 (TV)
DA05		DA03, DA04, DA05, Switch
DA13	A8600045	LED, TLR102C, Indicator
MISCELLANEOUS		
SA13,SA16	23145845	Slide Switch, 2C2P, SA13: Mode Switch SA16: AFC Switch
SA14	24060764	Band Switch (with RA50)
SA15	23145887	Push Switch, 1C1P, Memory Switch
COMPONENT NOT MOUNTED ON P.W. BOARD		
CAPACITORS		
C061	24617999	EL, 0.47mfd, 50v
C422	24095490	PF, 1.5mfd, $\pm 10\%$, 250v
RESISTORS		
Δ R452	24060972	VR, 20M ohm, 1/2w, B-Type FOCUS
R651	24058981	VR, 100k ohm, 1/5w, B-Type, SOUND VOLUME
R661	24940470	CC, 47 ohm, $\pm 20\%$, 1/2w

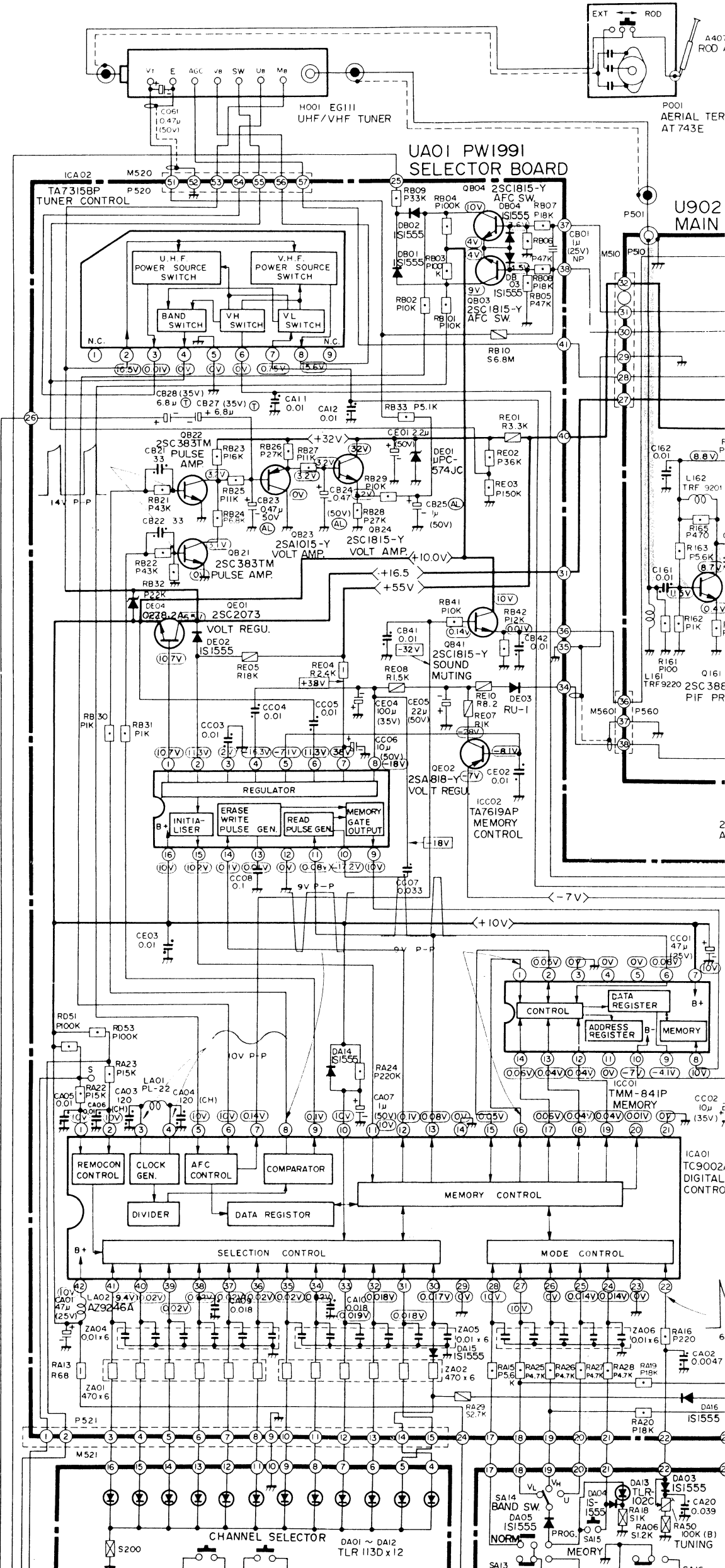
Schematic Location	Part No.	Description
COILS AND TRANSFORMERS		
L462	23227925	Deflection Yoke, TDY3061B
L901	23200956	Degaussing Coil, TSB2078
Δ T801	23213346	Transformer, TPW1129, Power
SEMICONDUCTORS		
Q801	23114867	NPN Transistor, 2SC1664
Q808	23114865	NPN Transistor, 2SC2198 (FA-1), Converter Out
MISCELLANEOUS		
E912	23847629	Rubber Wedge
P001	23142796	Aerial Terminal Board, AT-743E
P661	23163946	Earphone Jack
Δ P801	23176311	Power Cord (AC)
Δ P802	23164861	Power Socket, 2P (AC)
Δ P803	23164860	Power Socket, 5P (DC)
Δ S801	23145871	Push Switch, POWER (Push-ON, Push-OFF)
Δ S802	23145778	Switch, MAINS ISOLATING
S901	23145846	Push Switch, DEGAUSS
V901M	23102994	Purity and Convergence Manget Assembly, MAG1004
W661	23151184	Speaker, SPK1033, 8 cm (round) 32 ohm
Δ Z461	23226600	H.V. Block, TFB3032A
UA12	23145765	Indicator Board Assembly
ACCESSORY		
Y101	23959179	Owner's Handbook
Y105	23152002	Earphone
Y141	23124050	UHF Loop Aerial
Y142	23293995	Matching Trans
P831	23164705	Car Battery Cord (DC)
PICTURE TUBE AND TUNERS		
Δ V901	A5140511	Picture Tube, 160AB22 (Y)
H001	23121896	VHF/UHF Tuner, EG-111
NOTE: ABBREVIATIONS		
Capacitors.....		
CD: Ceramic Disk		
PF: Plastic Film		
EL: Electrolytic		
MP: Metalize Paper		
Resistors		
CF: Carbon Film		
CC: Carbon Composition		
OMF: Oxide Metal Film		
VR: Variable Resistor		
FR: Fusing Resistor		

16. SCHEMATIC DIAGRAM < MODEL C-690 >

NOTE: The parts identified by shading and Δ mark are critical for safety. Replace only with part number specified.

OBSERVATION OF VOLTAGES AND WAVE

1. Voltages read with VTVM from point shown to chassis ground, line voltage 220 volts, colour bar signal.
2. Voltages reading may vary $\pm 20\%$.
3. The schematic shown is representative only.
4. All waveforms are taken using a wide band oscilloscope and a low capacity probe.
5. Check FINE TUNING, AGC, BRIGHTNESS, CONTRAST and COLOUR controls for best picture, make sure that CONTRAST and COLOUR controls are in mid position and BRIGHTNESS control is almost in maximum position.
6. Waveforms are taken using a standard colour bar signal.
7. Voltages in the brackets < > are measured under the DC operation.



ES AND WAVEFORMS

shown to chassis
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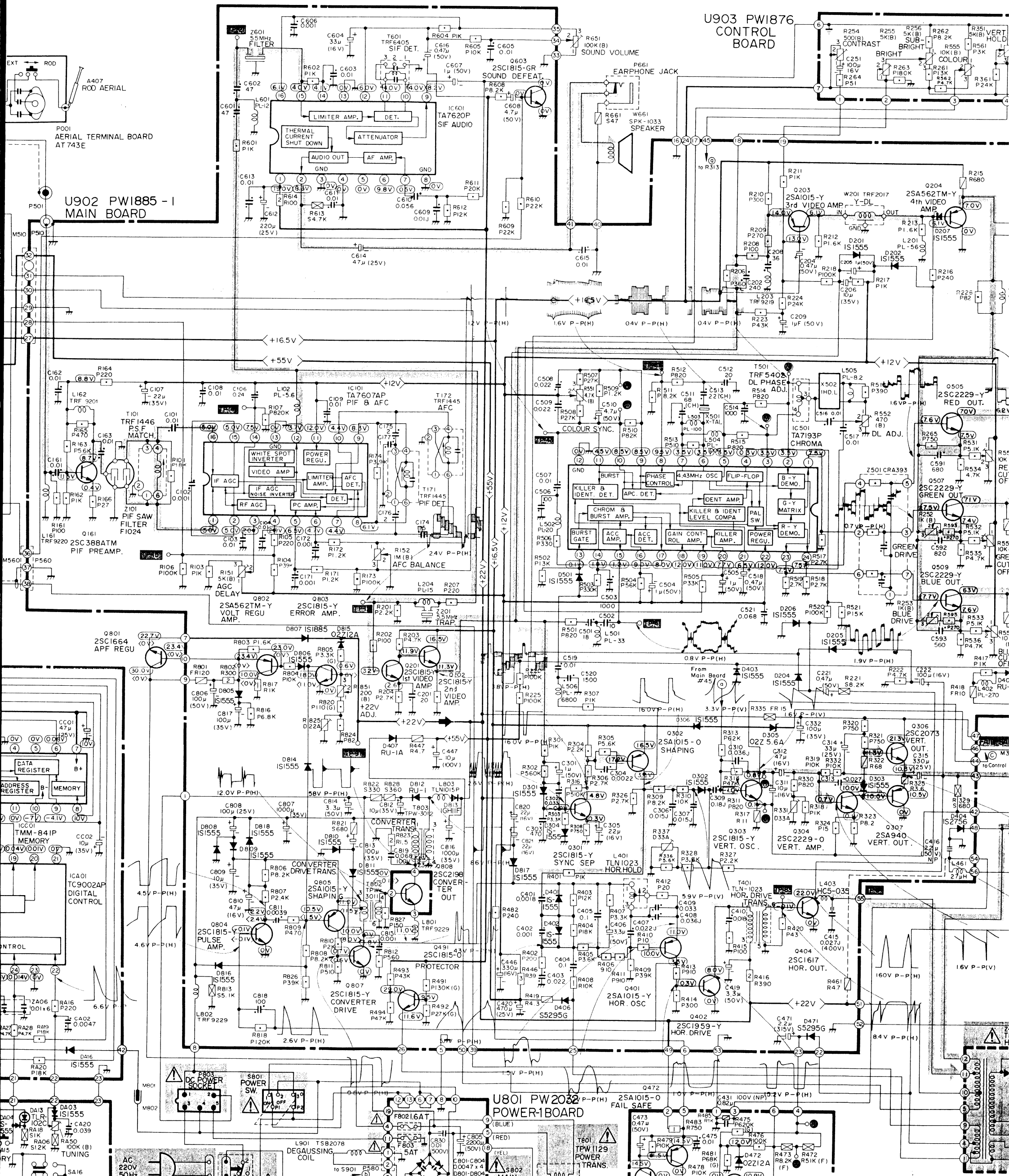
NOTES:

1. D.C. resistance value of a principal transformer is shown in this schematic diagram. These are measured for separated from the circuit.
2. The circuits subject to change without notice.

EXPRESSION

VALUE OF RESISTOR, CAPACITOR and INDUCTOR

1. Resistance is shown in ohm, k=1,000, M=1,000,000.
2. Unless other wise noted in schematic, all capacitor values less than 1 are expressed in mfd and the values more than 1 in pF.
3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μ H, and the values less than 1 in H.



CAPACITOR and INDUCTOR

0.000, M=1,000,000.
 atic, all capacitor values less than 1 are
 more than 1 in pF.
 atic, all inductor values more than 1 are
 less than 1 in H.

RESISTOR

Type	Mark
Carbon Composition	S
Oxide Metal Film	R
Insulated Carbon Film	P
Wire Wound	W
Cement	No Mark
Variable Resistor	
Positive Thermistor	
Negative Thermistor	

Table 1

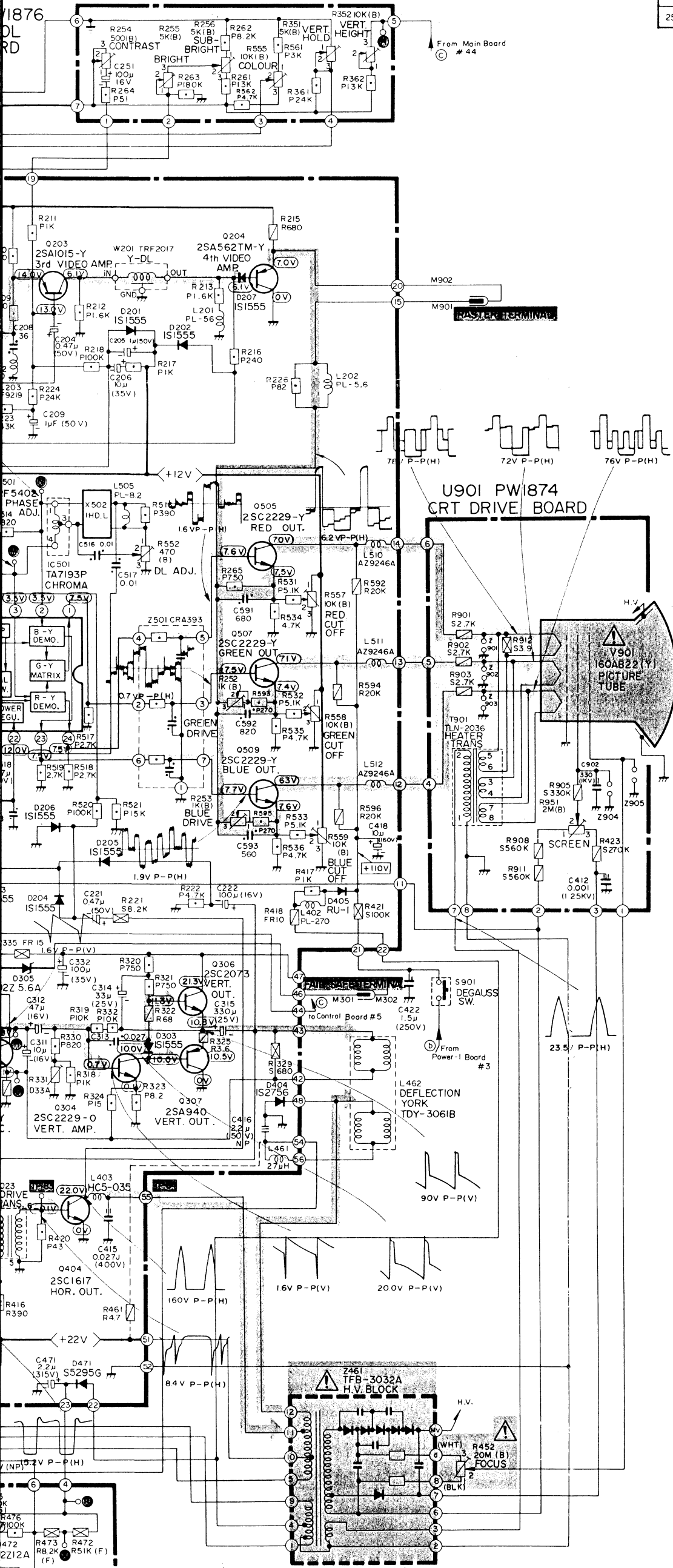
Watt	Mark
1/16 W	
1/8 W	
1/4 W	
1/2 W	
1 W	
2 W	
3 W	
5 W	
10 W	
15 W	
20 W	
25 W	

Table 2

CAPACITOR

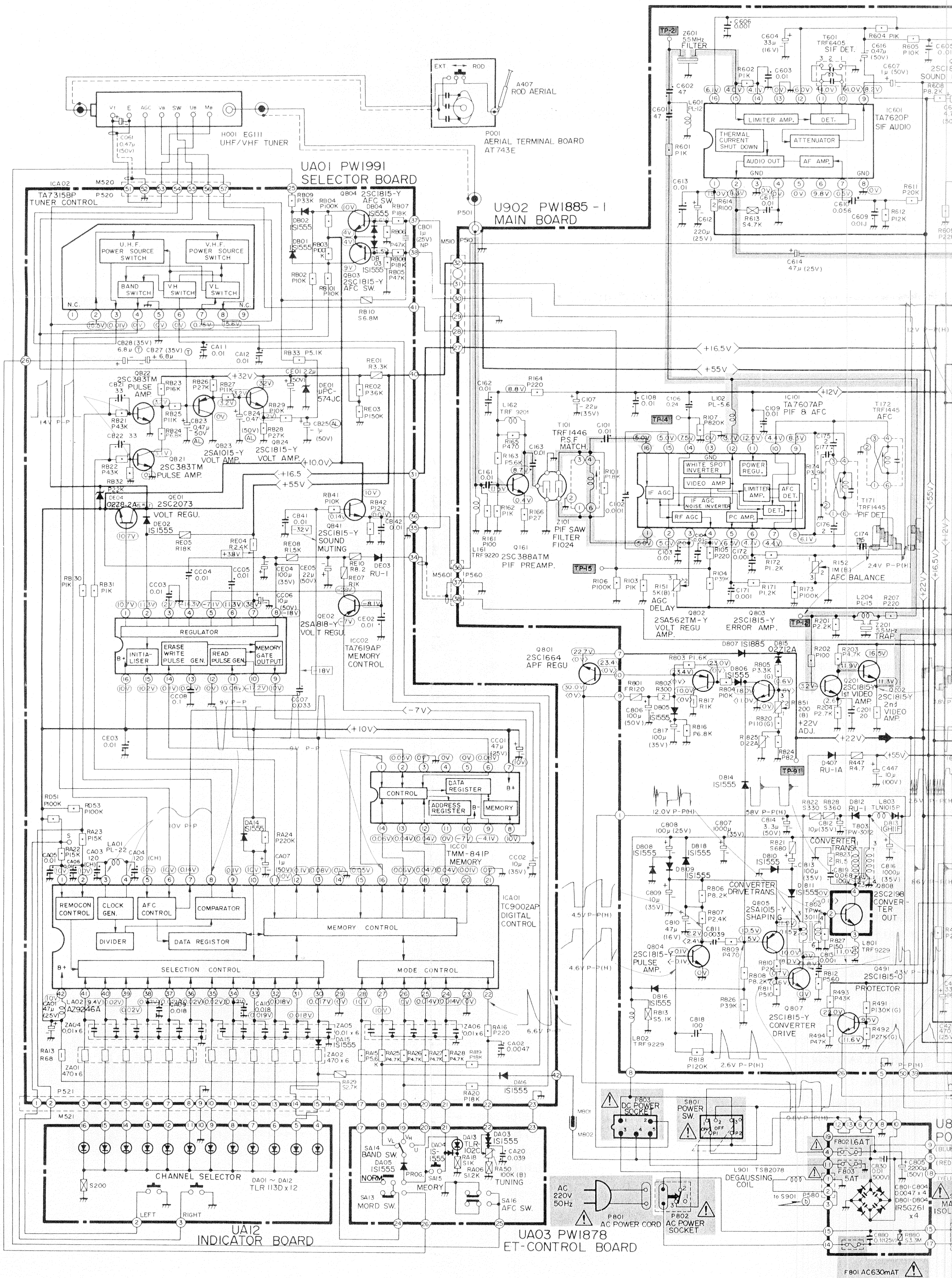
Volt	Mark
6.3V	
10V	
16V	
25V	
35V	
50V	
160 ~ 350V	
350 ~ 630V	
2.5KV	
Chemical	
Chemical Non Polar	

Table 3

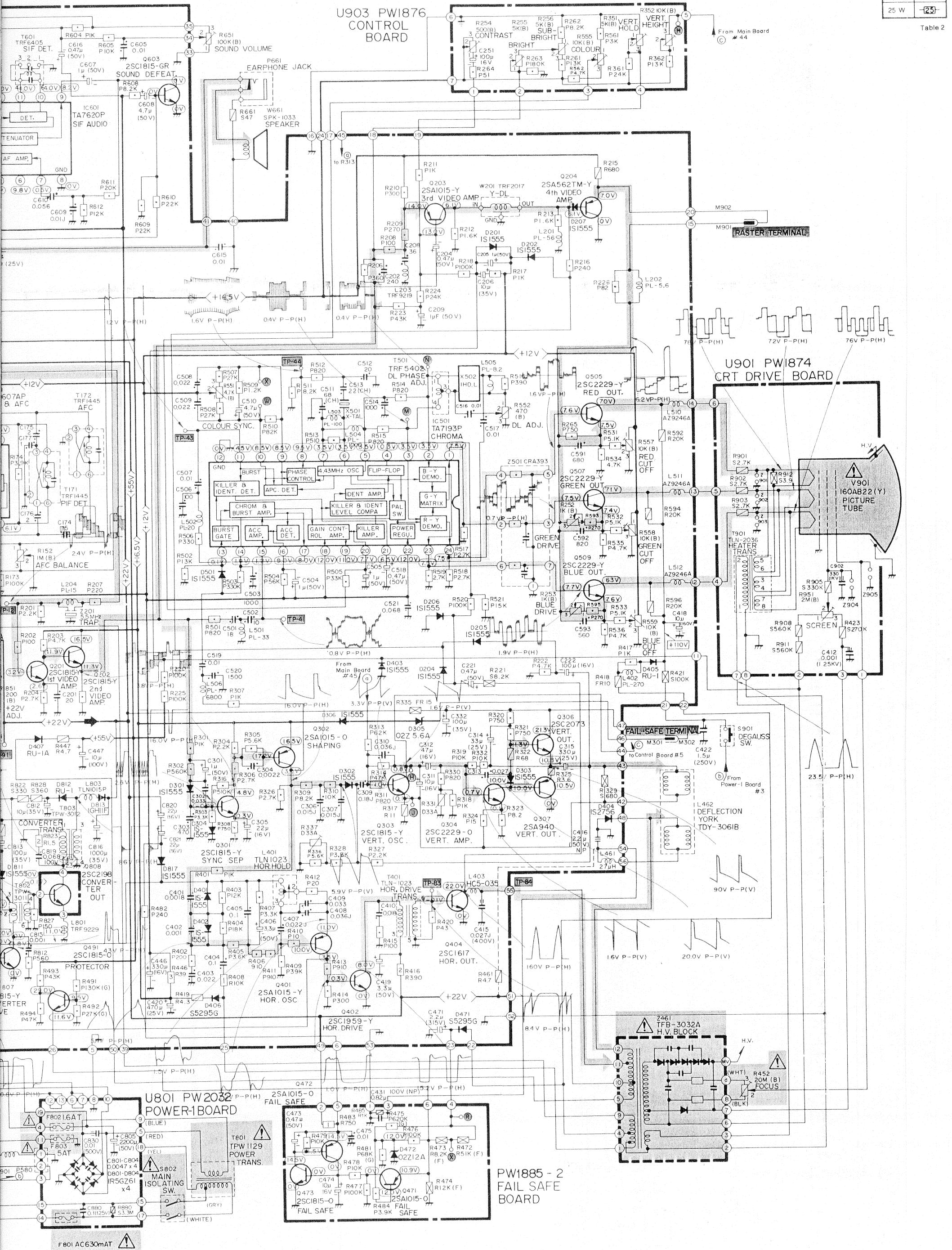


4. All waveforms are taken using a wide band oscilloscope and a low capacity probe.
5. Check FINE TUNING, AGC, BRIGHTNESS, CONTRAST and COLOUR controls for best picture, make sure that CONTRAST and COLOUR controls are in mid position and BRIGHTNESS control is almost in maximum position.
6. Waveforms are taken using a standard colour bar signal.
7. Voltages in the brackets < > are measured under the DC operation.

2. The circuits subject to change without notice.



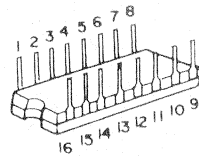
expressed in μH , and the values less than 1 in H.

Table 1Table 2

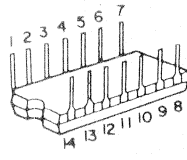
TERMINAL VIEWS OF IC'S AND TRANSISTORS

IC's

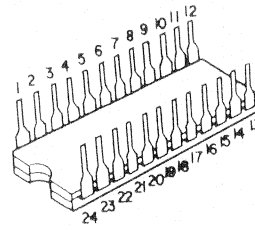
① TA7607AP
TA7619AP
TA7620P



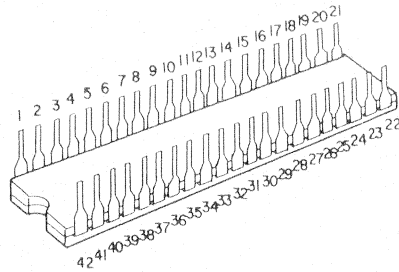
② TMM 841P



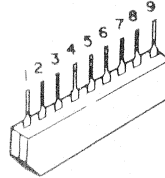
③ TA193P



④ TC9002AP



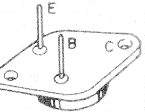
⑤ TA7315BP



TRANSISTORS

① 2SC383TM
2SC388ATM
2SC1815
2SA1015
2SA562TM
2SC1959

② 2SC2198
2SC1617
2SC1664
Q808



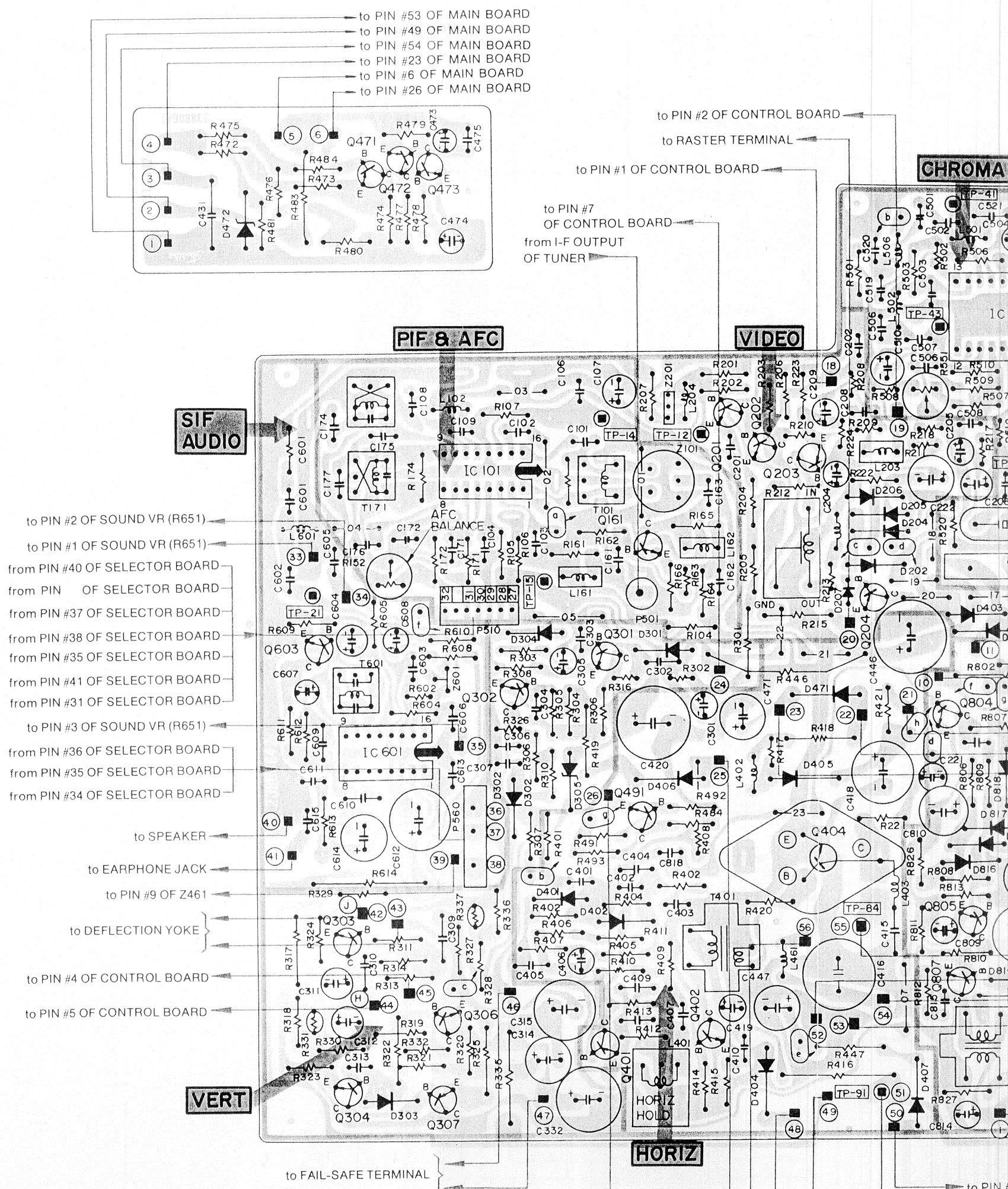
17. P.C. BOARD WIRING LAYOUTS

FAIL SAFE BOARD PW-1885-2

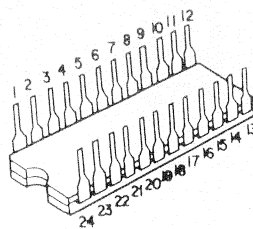
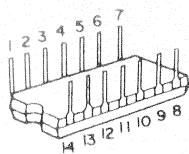
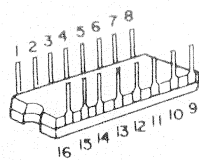
BOTTOM (FOIL) SIDE

MAIN BOARD PW-1885-1

BOTTOM (FOIL) SIDE

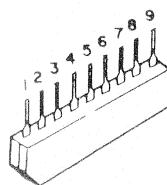
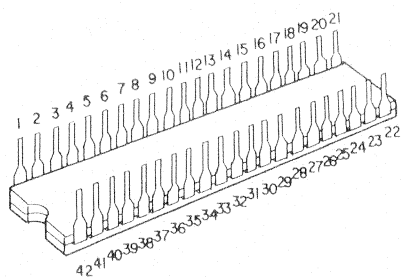


2SC1617
2SC1664
Q808



④ TC9002AP

⑤ TA7315BP



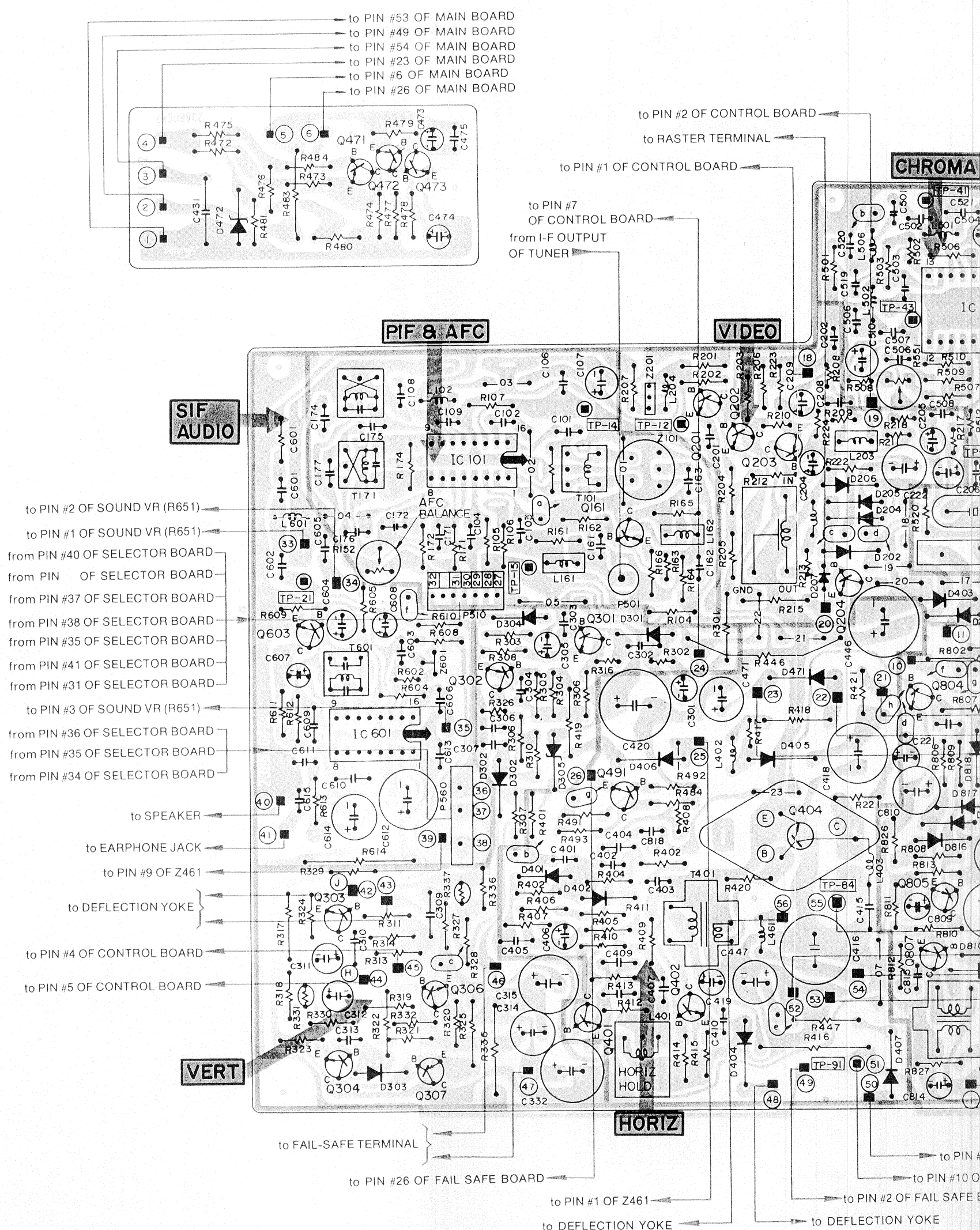
17. P.C. BOARD WIRING LAYOUTS

FAIL SAFE BOARD PW-1885-2

BOTTOM (FOIL) SIDE

MAIN BOARD PW-1885-1

BOTTOM (FOIL) SIDE

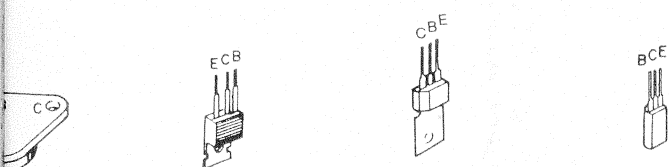


2198
1617
1664
B

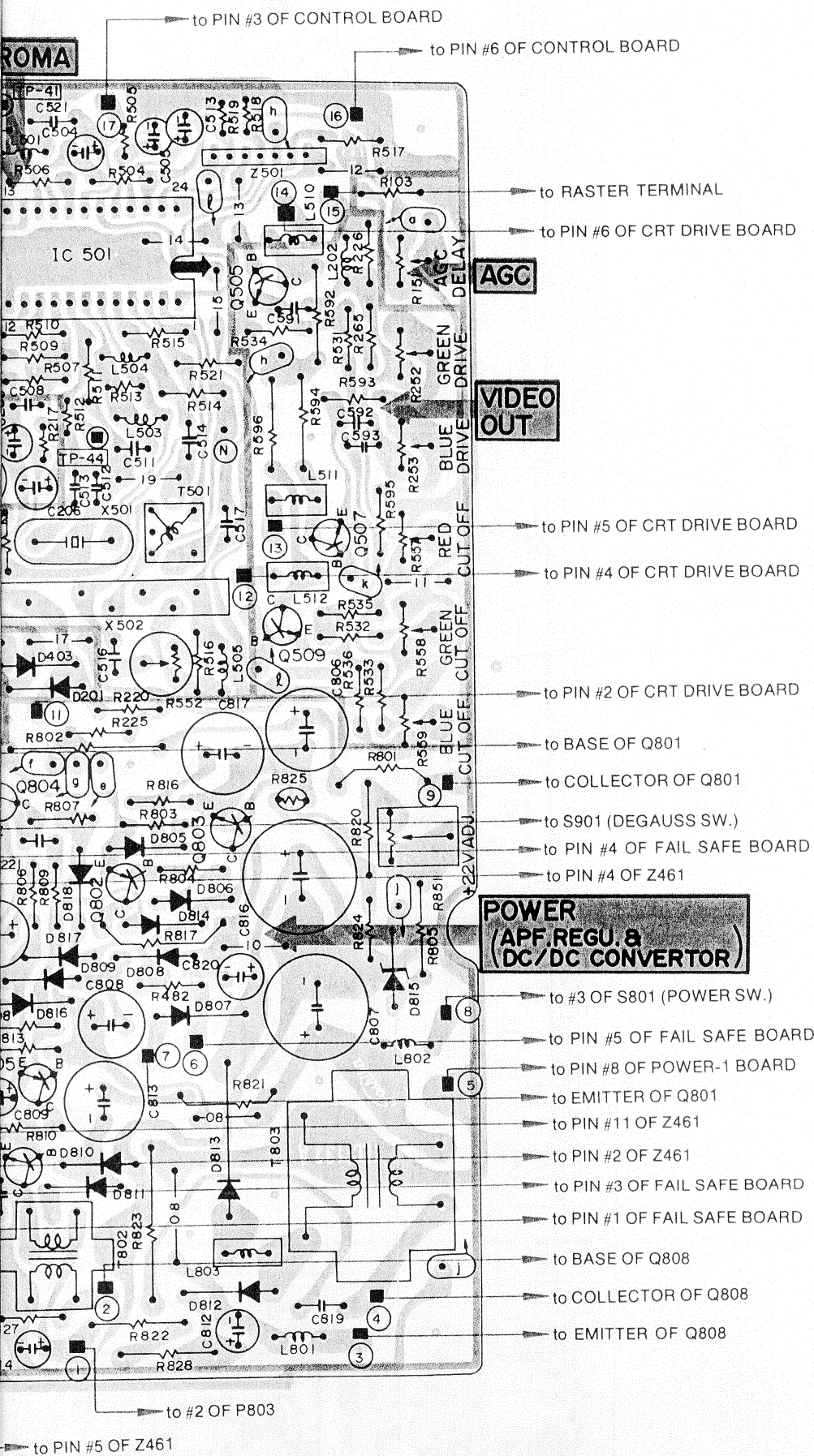
③ 2SA940
2SC2073

④ 2SA818

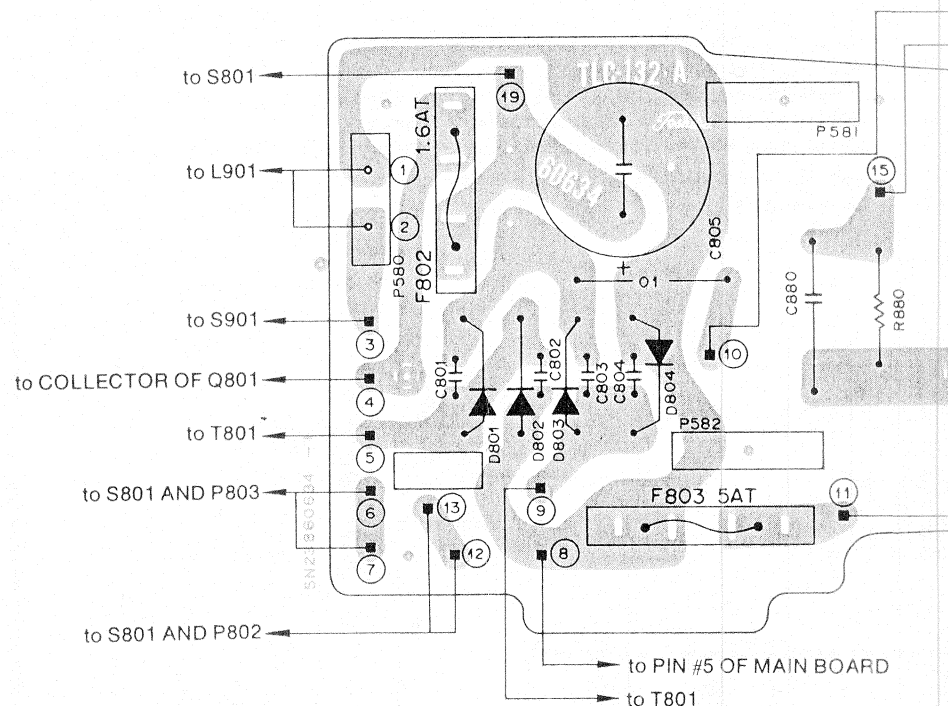
⑤ 2SC2229



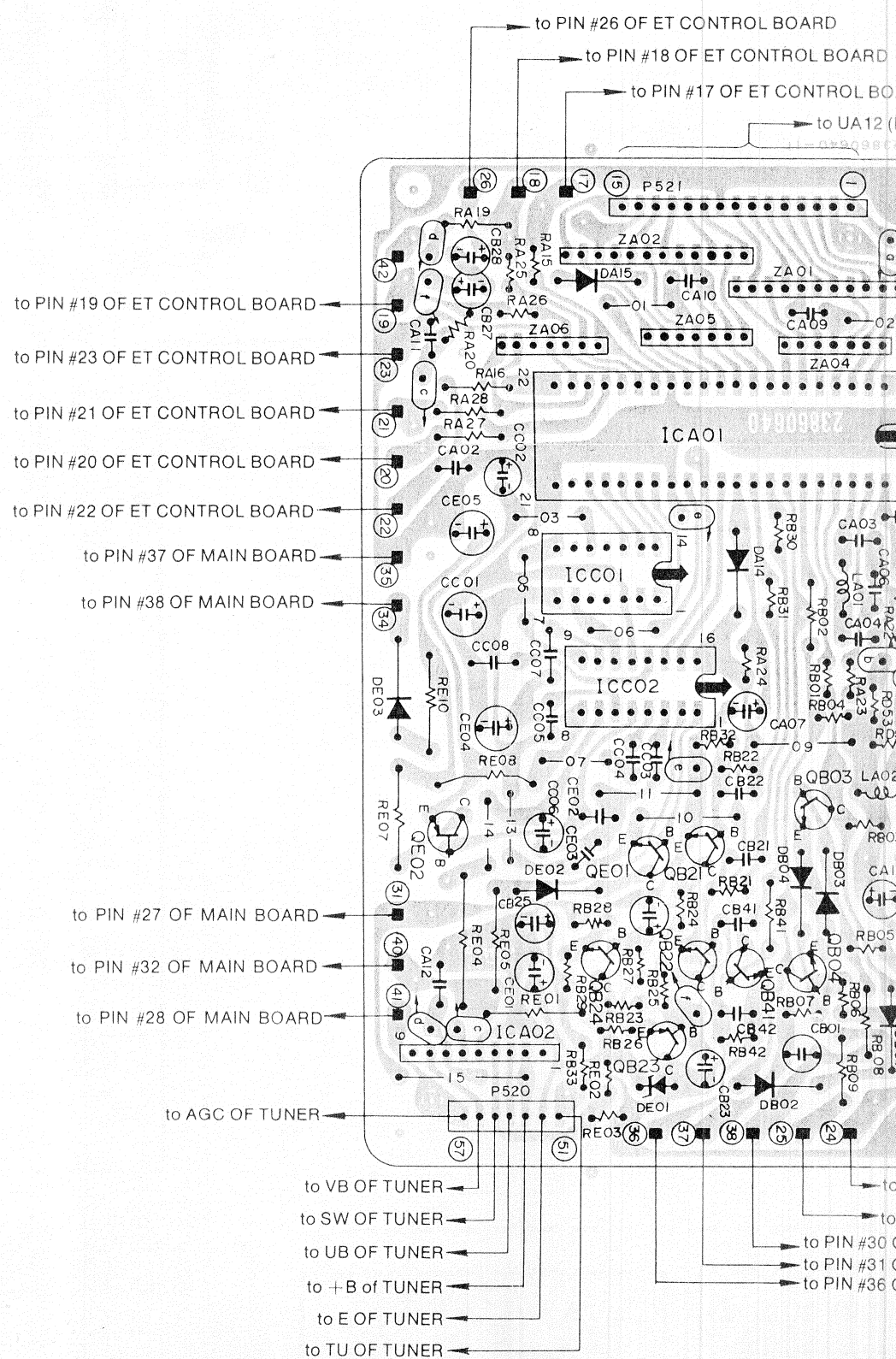
35-1



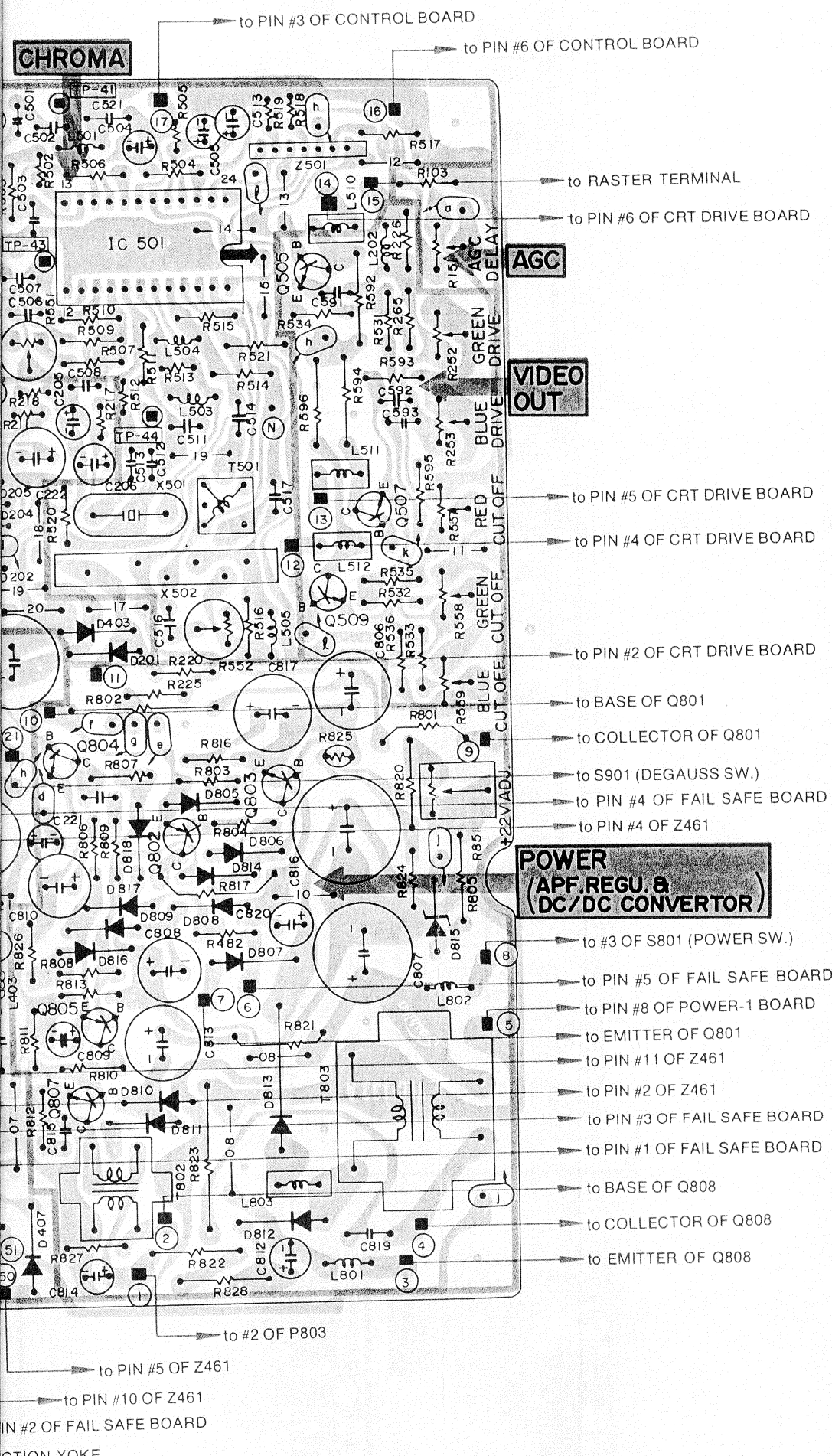
POWER-1 BOARD PW-2032 BOTTOM (FOIL) SIDE



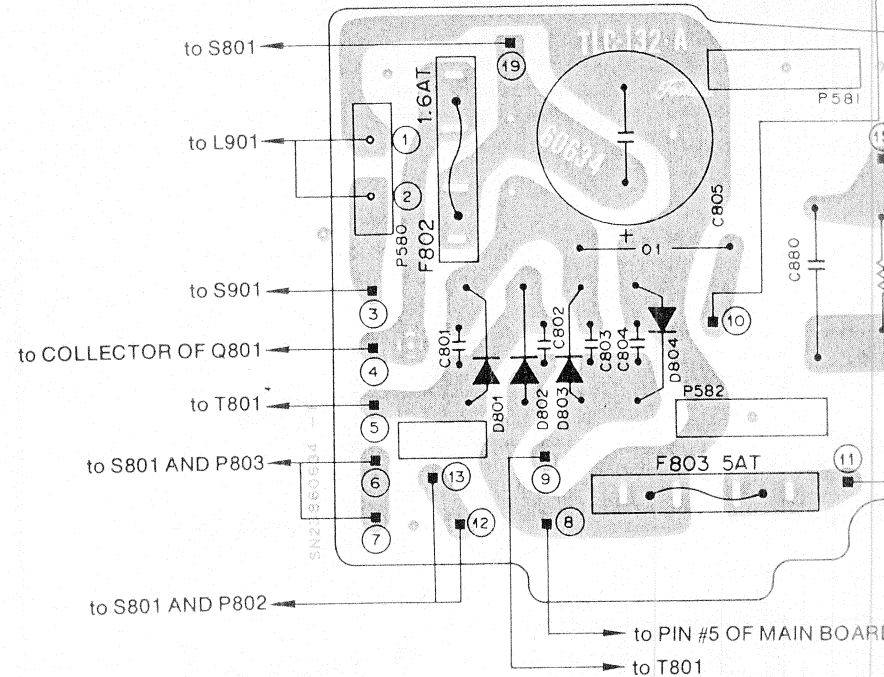
SELECTOR BOARD PW-1991 BOTTOM (FOIL) SIDE



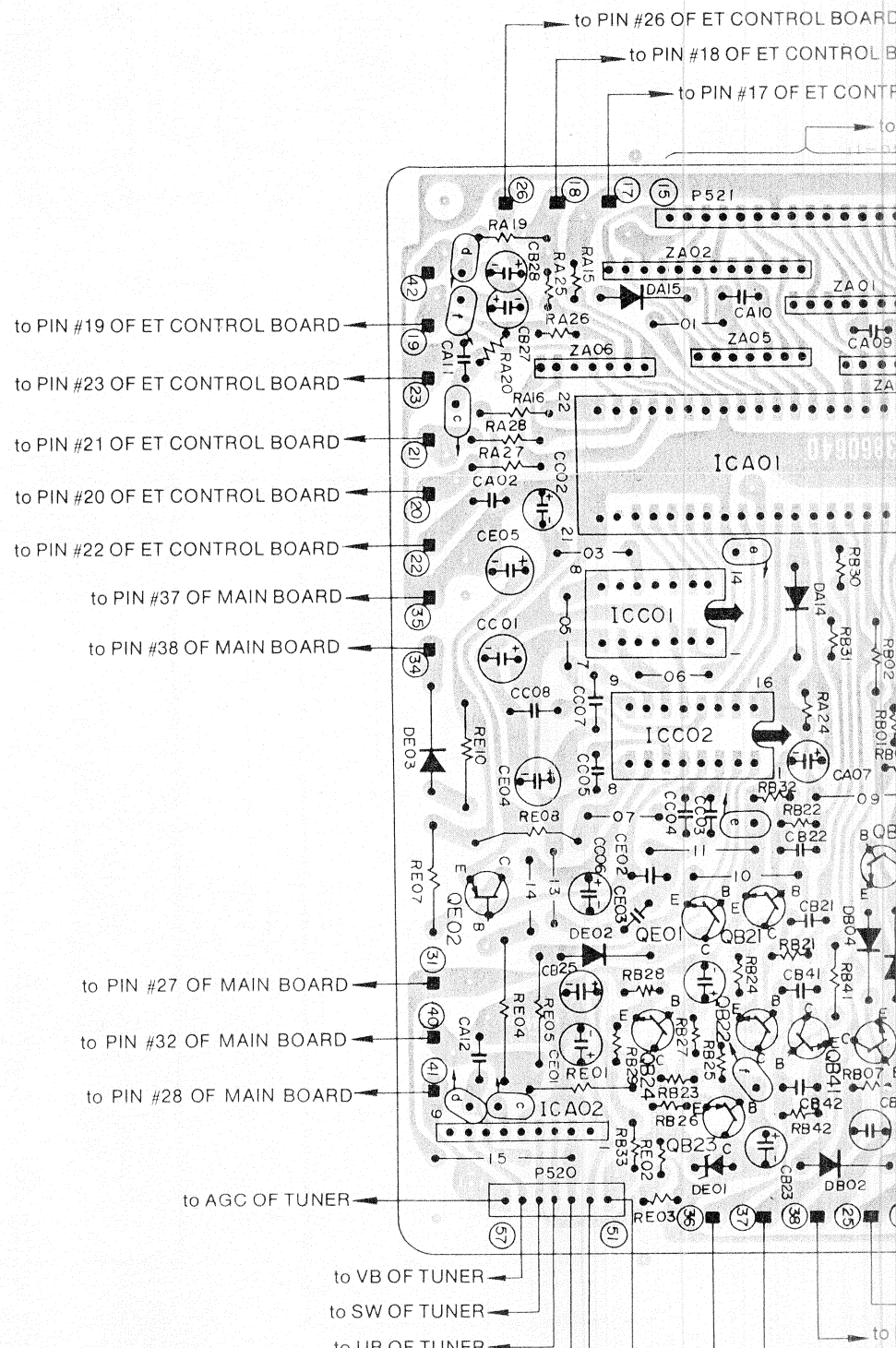
V-1885-1
SIDE



CTION YOKE

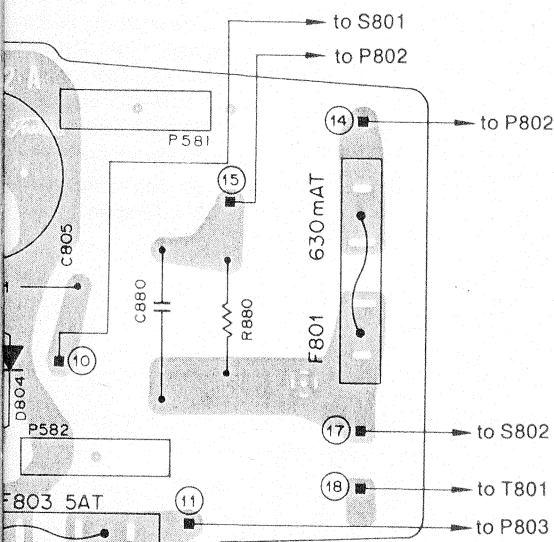


SELECTOR BOARD PW-1991
BOTTOM (FOIL) SIDE



D PW-2032

Y) SIDE



PIN #5 OF MAIN BOARD

T801

RD PW-1991

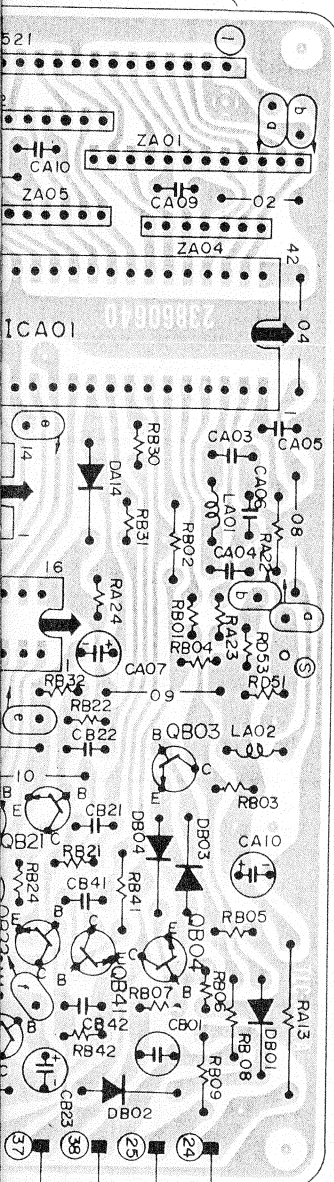
L) SIDE

ET CONTROL BOARD

8 OF ET CONTROL BOARD

PIN #17 OF ET CONTROL BOARD

to UA12 (INDICATOR BOARD)



to PIN #24 OF ET CONTROL BOARD

to PIN #25 OF ET CONTROL BOARD

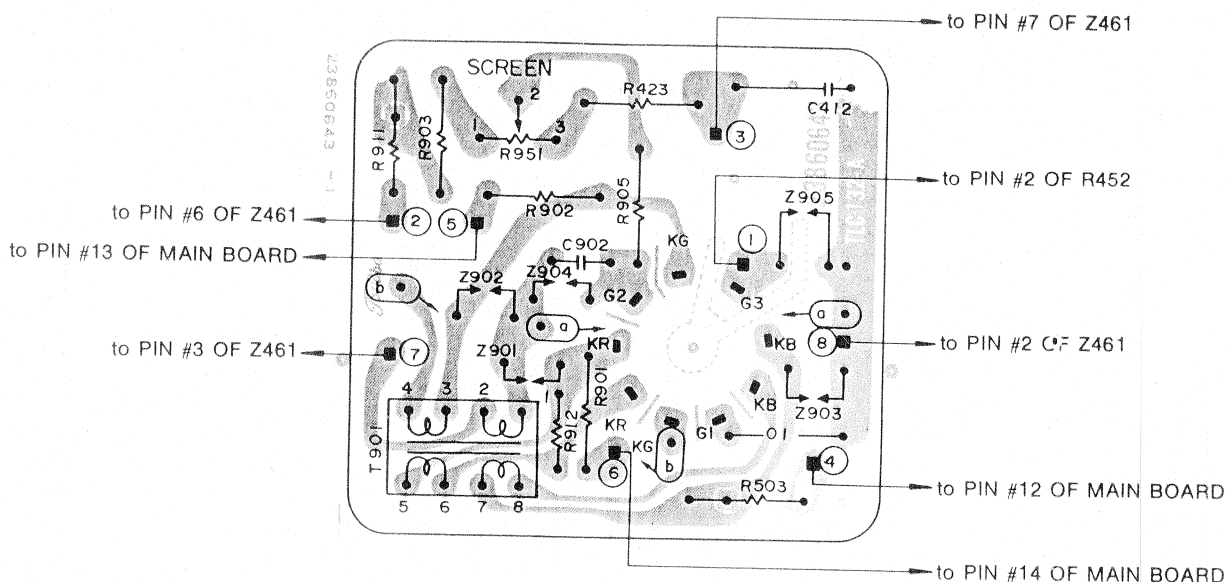
to PIN #30 OF MAIN BOARD

to PIN #31 OF MAIN BOARD

to PIN #36 OF MAIN BOARD

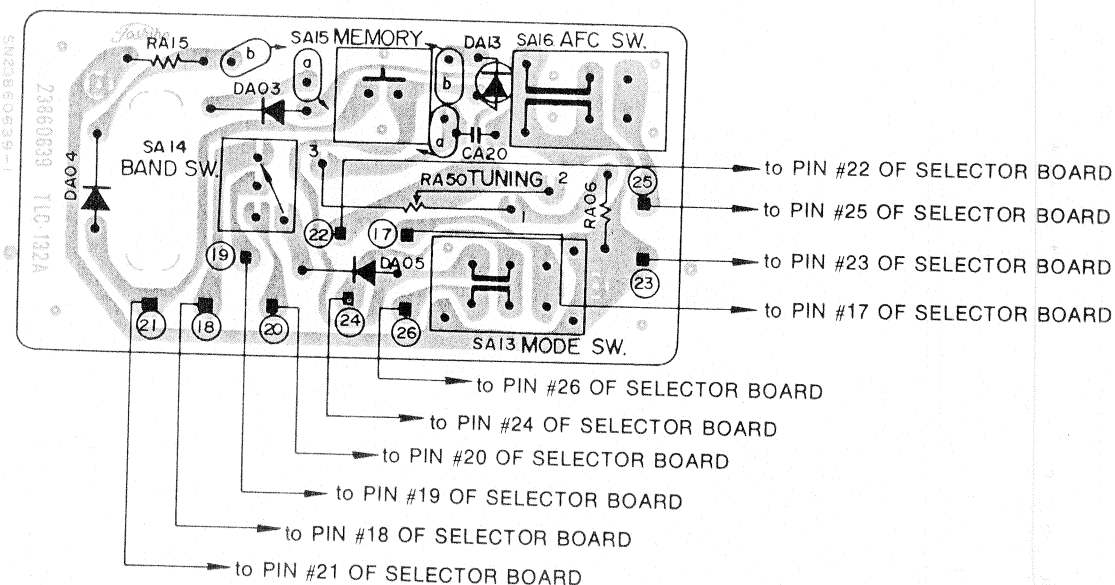
CRT DRIVE BOARD PW-1874

BOTTOM (FOIL) SIDE



ET-CONTROL BOARD PW-1878

BOTTOM (FOIL) SIDE



CONTROL BOARD PW-1876

BOTTOM (FOIL) SIDE

